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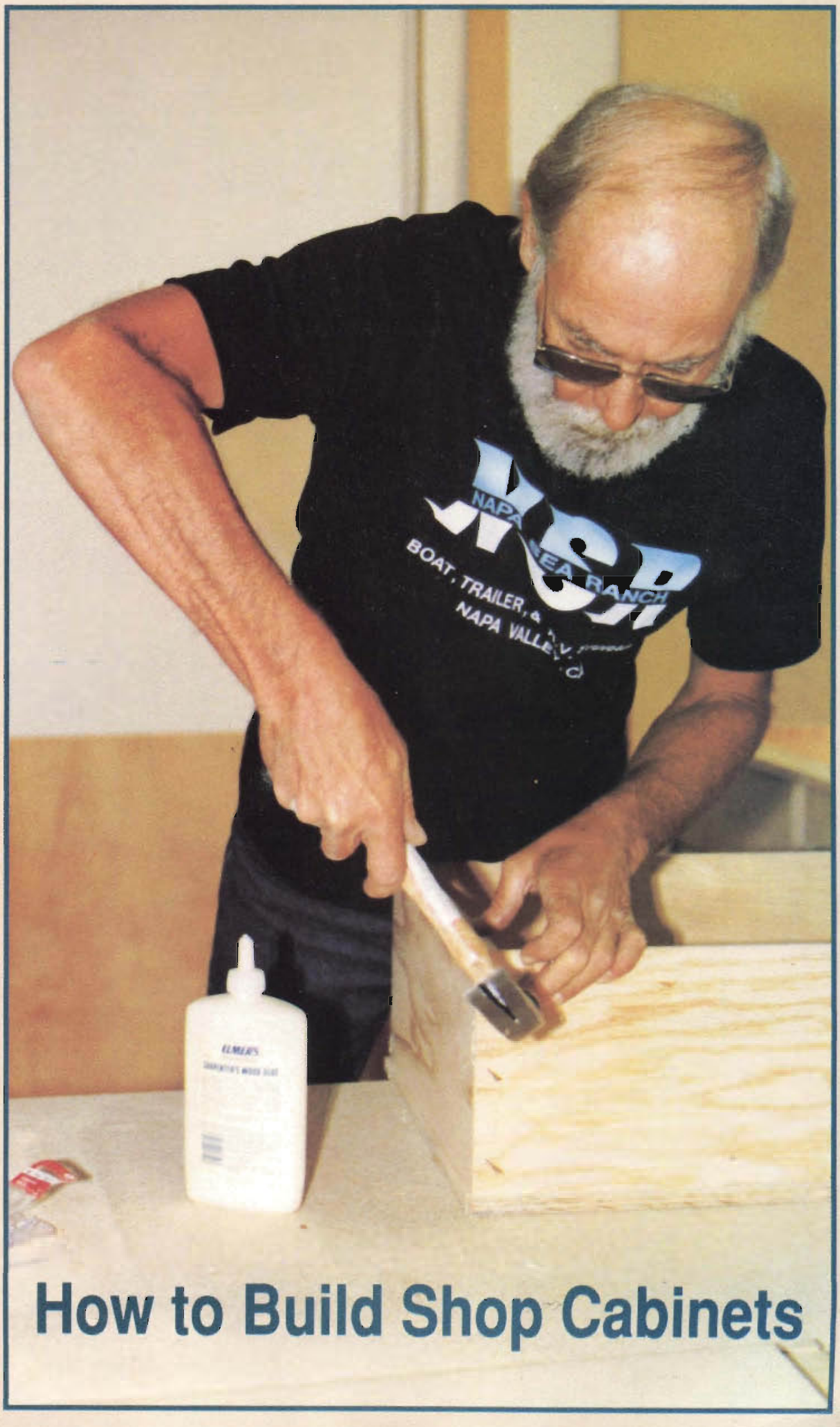

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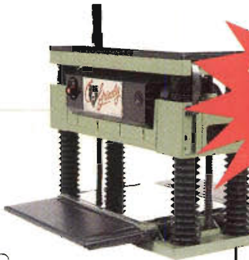

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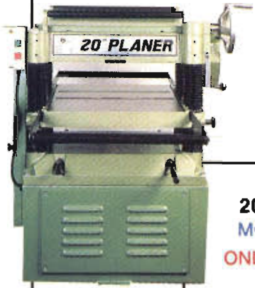

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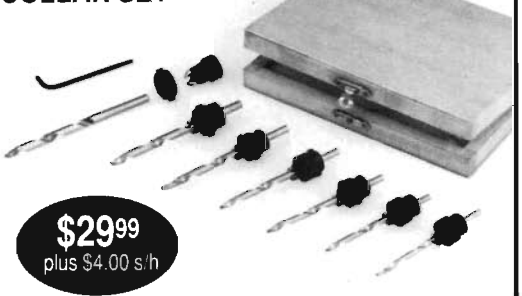

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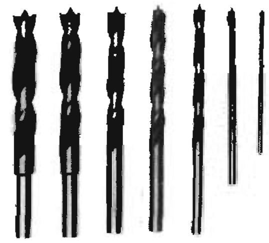

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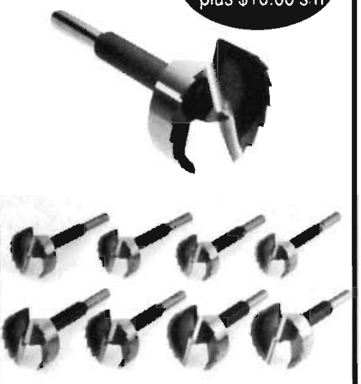

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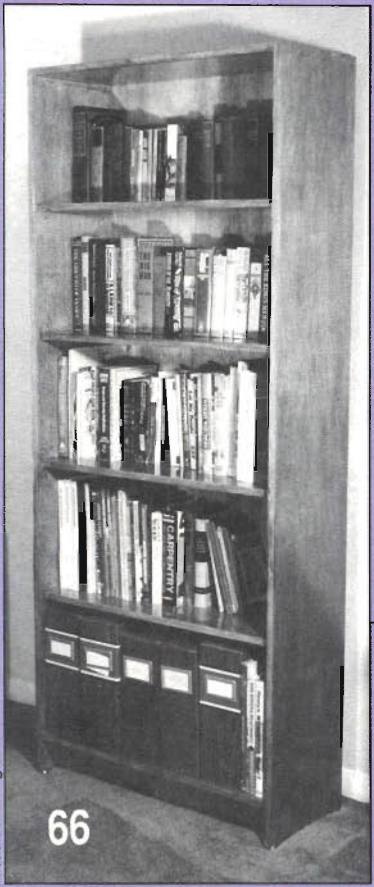


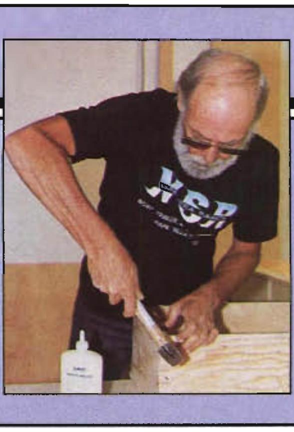
Jacob Schulzinger

58

Ken Sadler

On the Cover

Rod Evenson of Rod's Professional Furniture Service in Vallejo, California nails together the drawers for our shop cabinet project on page 30 of this issue. Designed by Link Lincoln, the bottoms of these drawers extend beyond the sides and slide between two runners installed in the carcase. It's a simple way to make strong drawers, and the modular design of the cabinet system allows you to customize it to your shop needs.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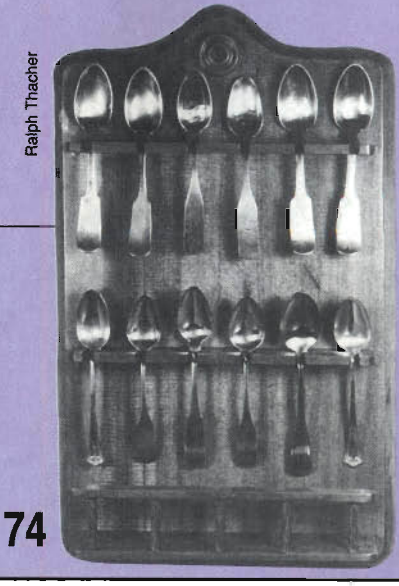

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Clear Cuts

A year ago at this time, in this space, I was talking about forest and forestry issues, the issues involving the material we use. Woodworkers were becoming aware of how their material is obtained and at what real cost. I think most of us share a deep concern for the environmental portion of the equation. The question is where do we go from here?

The question of whether or not we should boycott tropical woods hasn't been clearly answered yet. Timber industry people suggest that this would eliminate any value the trees might be perceived as having, and give the landowners all the more reason to clear and *burn* the forest for agriculture. Just because they're timber industry people doesn't make them automatically wrong (or right). Greenpeace says that the bulk of tropical deforestation has to do with factors other than the logging industry. They cite population pressure, international debt, and inequitable patterns of land ownership as the root problems.

Closer to home we've decided to "save" the Northern spotted owls despite the grumblings of Northern spotted lumberjacks. It seems to me that these guys should should be grateful to the owls—in the long term the owls probably saved their industry. In the past two years, they have cut down more than three times the amount of trees that current growth can replace. Now they can't cut so many trees, so some of them are out of work. In the long run, though, they can learn to plant and care for trees, and assure their industry has a future.

To me, it's a given that we have to preserve the forests. We have already cleared enough land. We've got to concentrate on replanting.

Man will always have a need for wooden items. That means we'll have to figure out a way to maintain Earth's supply. Though it might make some environmentalists shudder, I think we do have to be able to look at some trees as a crop. The timber industry already does, of course, but they seem to see *all* trees that way. We've got to be able to grow a *sustainable yield* of lumber on some well managed farms all over the world.

To support this, we need to find out where our wood comes from. We need a system for identifying how the wood is harvested and the forest managed. Ask your lumber man these questions. He may not know the answers, but he'll know you're interested and he'll get interested if he understands that you'd prefer to buy ecologically sound products.

Let's stop bickering over postulations like spotted owls vs. jobs, and get on with the practical concerns of providing wood for the future. By just doing that right, we'll help assure that Earth has a future.

David M. Camp

Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.

Not Safe from Absurdity

When I got my back issue and read the letter from Ron Holladay in the January 1990 Issue (#52), I just had to reply. He must be a combination of a weirdo, an old granny fussbudget, and a real nut. According to his own admission, he is quite a sight when adorned with all his regalia: Mr. Safety? How in hell he can do any work—and do it with any degree of accuracy and skill—is quite beyond me. For a person to burden himself with all that space junk indicates he is either a little touched, his elevator doesn't go all the way up, or he is afraid of his own shadow.

I sure would not like to work for him; I can state for a certainty that my customers would run in fear from him.

I'll be 74 next birthday, and I've been in the woodworking business for something like sixty years. In all that time I've only chopped my fingers once, and that was when an out of control 28–wheeler chose to make his presence known by smashing through the front window of my shop just when I was cutting a board. I have never used a machine with a guard. It is my impression that a person who uses a guard spends all his mental energy trying to operate the machine around the restrictions imposed by such a guard.

Authorities and engineers have spent countless millions designing and incorporating safety measures into cars, but we still have a terrible accident toll. It's not cars or guns that kill, it's people. The same can be said for woodworking machinery; even with a guard, a split second's thoughtlessness and an accident happens.

Occasionally I wear a dust mask if I'm sanding for any length of time. I don't finish in my shop so there's no need for respirators. In all those sixty odd years, I've never had to wear ear plugs.

I've only recently become a subscriber to your great magazine. Too bad there are not publications like this in Canada—but you Americans always had it over us more conservative types.

C. L. Widdicombe
Western Ontario Woodworker
Best Damn Folk Art Woodman There Is

More on Carving Tools

I'd like to comment on parts of the article "Carving Tools" by Graham Blackburn (*Tried and True, PW* #55, July 1990). Regarding wood vs. plastic handles, I have some wood handled ones over fifty years old that are still going strong. I also have some much newer ones with plastic handles that are shattered!

It is true that carving gouges' sweep is identified by numbers, #2 being the shallowest. Each manufacturer, however, apparently listens to a different drummer as no two are identical in the arc of the sweep.

I agree with Mr. Blackburn that buying carving tools in sets is not recommended, but one should "obtain what you need as you need it." But buying different brands just to get different handles for identification purposes is of little value. After all, you might have to get more than one tool from the same manufacturer. The Italian Master who taught me fifty years ago always laid his chisels and gouges with the edge facing him so he could quickly select the shape he needed.

Blackburn's description of back–bent gouges is confusing. A back–bent gouge has an inverted curve—the opposite of a front–bent (spoon) gouge. It is true that you can turn a regular gouge over and use it that way, but a back–bent does it faster and smoother. It's practically indispensable for relief work. A properly shaped back–bent gouge is also hard to find; the only properly shaped ones I know about are the Swiss Made brand from Woodcraft Supply Corp. (Box 1688, Dept.90WX10Q, Parkersburg, WV 26101, phone 800-225-1153).

C. A. Brown
Green Mountain Woodcarvers
Waterville, VT

Family Recipe Rediscovered

I have always learned from and enjoyed woodworking magazines, but your article "Custom Wood Filler" (*PW* #56, September 1990) solved a problem I have had for fifty years! When I was just a young boy, my Grandfather used to mix his own wood filler to perfection, but I could never figure out what glue he used. Of course, in the Forties, glues were not as sophisticated as they are now, and perhaps this lead me astray in my search.

Perhaps with your help, I may get to be half as good as my "Bungy" was—and at just about the same age he was then.

W. R. Quinn
Laval, Quebec, Canada

Cube Kudos

I have just finished building Dick Dorn's drum sander dust collector in the September Issue ("The Cube and Canister Drum Sanding System," *PW* #56). The plans and text were very clear and the idea of using a cube for six different sanding drums is absolutely great. I spent many happy hours building this sanding system which I plan to use frequently.

My drill press has a non–metallic platform so I couldn't use your magnet idea to hold the canister in place; I screwed a piece of plywood to the canister and use clamps to secure it in place.

I consider this one article to be easily worth several years of subscriptions.

O. L. Williams
Lincoln, NE

Another Fine Drill Press Idea

I haven't built it yet, but guess what went through my mind when I saw Ken Sadler's angle drilling drill press jig ("Here's An Angle," *PW* #57)? I think I will insert 30 to 35 magnetic ringlets in the base. I think the magnets along with anti–slip covering will work great for most jobs. It looks like a very fine jig.

Regarding Charles Davis' tip in the same issue about removing plastic laminate, I do this quite often, but I don't use a blade. I use a spray bottle with solvent in it. One hand sprays the solvent, the other hand lifts the laminate. I then use the solvent to clean the back side of the laminate for reuse.

Dick Dorn
Oelwein, IA

Author's Response Prompts This Response

In Issue #57 (November 1990), Mr. Maurice Bullard openly and honestly stated his opinions regarding the Makita 2711 table saw (reviewed in "Tool Talk," PW #56, September 1990). These opinions were based on using the machine for a little over a year. I read Mr. Sanford Wilk's reply and considered it unprofessional and inappropriate, and like the original review, a disservice to your readers. There was no service provided, no value added by Mr. Wilk's comments. They were, in my opinion, defensive and demeaning to Mr. Bullard. They apparently were not based on first–hand experience, as Mr. Wilk refers to "the primary tester of the unit," and most certainly were not based on over a year's experience.

Mr. Wilk further erodes his credibility in stating that he "agree(s) with all (points) except the last one" and then going on to disagree with all including the last one. Suggesting that Mr. Bullard had the saw guard removed, was using a dull or low quality blade, and had an extension cord that was too long, is, in my opinion, completely uncalled for and solely an attempt to avoid looking inept. Mr. Wilk agreed with some of Mr. Bullard's statements and then went on to minimize the consequences as if Mr. Bullard's opinion did not matter.

I could go on but won't. Mr Bullard gave a much more practical, thorough and reliable review than did Mr. Wilk. I have never written to your magazine before—in fact I have never written to any magazine; but then, I have never been so irritated by an editorial reply. I sincerely believe that Mr. Bullard deserves an apology and Mr. Wilk a reprimand.

William Heintz
Plymouth, MN

Tricks of the Trade

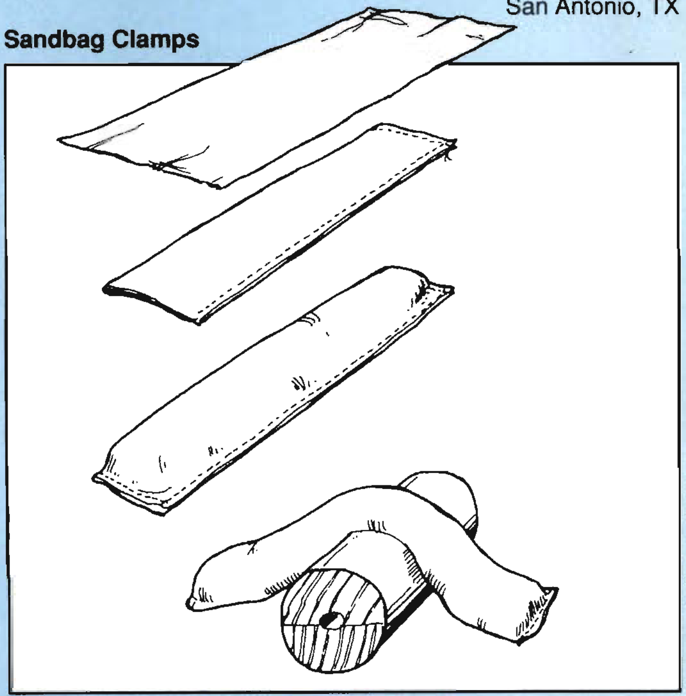
"Tricks of the Trade" shares readers' tips for making woodworking tasks easier and safer. If you've come up with a trick that would help other woodworkers, send it to "Tricks of the Trade," c/o Popular Woodworking, 1320 Galaxy Way, Concord, CA 94520. Include any photos or sketches that help illustrate your idea (we'll redraw them). We pay $25 for each trick we publish.

Table Saw Slot Slop

After many years of use, miter gauge bars and the slots they slide in on the table saw can wear, causing looseness and inaccuracy. If your table saw is just such an old–timer, you might tap the ends of the miter gauge bar horizontally for small headless machine screws (no. 10–32). You'll then be able to adjust for the wear.

Allan R. Nye
San Antonio, TX

Sandbag Clamps



Illustrations by Graham Blackburn

To hold odd–shaped pieces of wood for marking or gluing, make a sandbag clamp. Cut a strip of cloth about 6" wide and 16" long, fold it in half, and sew the long side and one end. Fill the tube with dry sand and sew up the open end. They work great and have lots of uses.

John Mulvihill
Raytown, MO

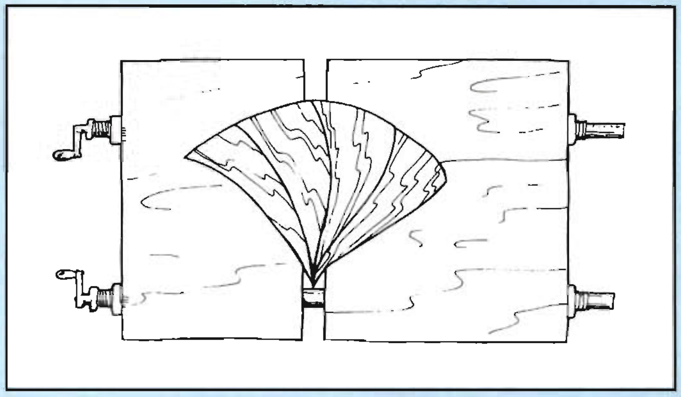
A Handy Glue Removal Tool

I made a special reamer for cleaning out old, dried up glue from disassembled joints when repairing furniture. Beginning with a worn out triangular file (the fellow who sharpens your saw blades probably uses enough of them that he'd be willing to give you one free), I ground it to a point as I ground off the teeth (cooling frequently to avoid drawing the temper). I left a slight hollow grind and then applied a handle and honed the edges of the tool on a hand stone. I find that this tool is less likely to alter the dimensions of the joint than is re–drilling or chiseling. For really tough cases, a dose of apple cider vinegar softens most old glue enough to make removing it very easy.

Hugh Foster
Manitowoc, WI

Gluing and Clamping Odd–Shaped Pieces

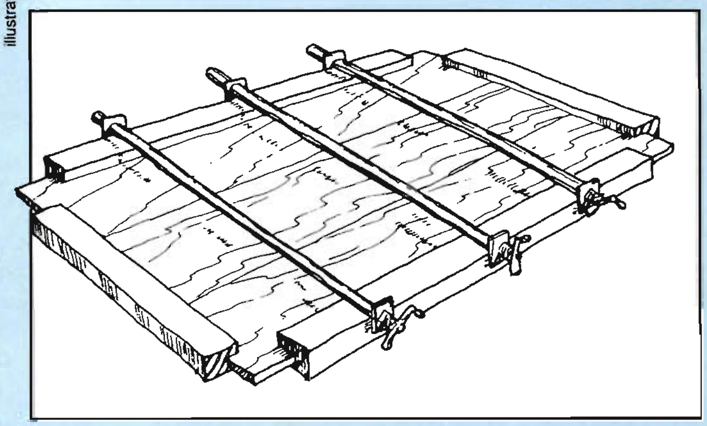
Dry–assemble the pieces in the center area of a piece of plywood that extends at least $^{1}/_{2}$" beyond the outside edges of the assembled pieces. Trace the outline onto the plywood; then remove the pieces. Cut the plywood in half, and bandsaw the outline. Cut off an extra $^{1}/_{4}$" on one side of the center cut so that the plywood forms do not bind and prevent the pieces from clamping tightly together. After applying glue and assembling the pieces, place the plywood forms around the assembly and clamp across the outside edges.



C. E. Rannefeld
Decatur, AL

Gluing Up Thin Stock

To keep stock as thin as $^{1}/_{4}$" from buckling when gluing up panels, make a "picture frame" around it. Cut four pieces a bit shorter than the panel dimensions from 1 X 3 stock. Cut a dado in each just wide enough to accept the panel boards. Apply glue to the board edges, slip the "frame" end pieces on, then the side pieces, and clamp. Be sure to cut your panel boards longer than needed as the frame end pieces may be glued to them.



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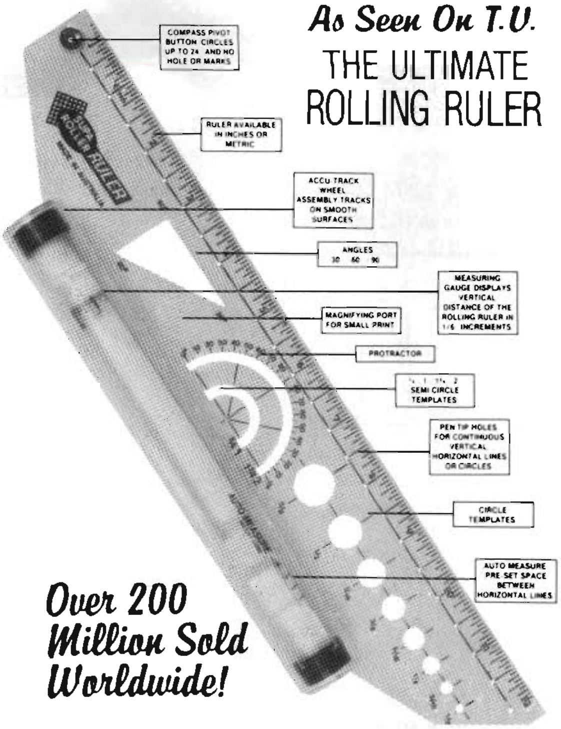
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			Dia.	Len.	Dia.	Len.	
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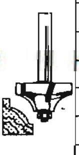
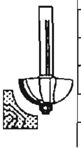
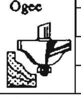
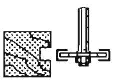
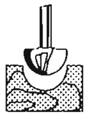
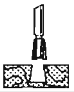
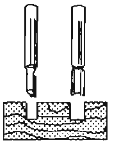
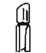
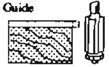
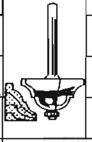
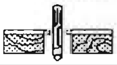
T101B		3/16	7/8	3/8	1/4	1-1/4	10.00
T102B		1/4	1	7/16	1/4	1-1/4	11.00
T103B		5/16	1-1/8	1/2	1/4	1-1/4	12.00
T104B		3/8	1-1/4	5/8	1/4	1-1/4	14.00
T105B		1/2	1-1/2	3/4	1/4	1-1/4	16.00
T110B		1/2	1-1/2	3/4	1/2	1-1/2	16.00
T111B		5/8	1-3/4	7/8	1/2	1-1/2	19.00
T112B		3/4	2	1	1/2	1-1/2	20.00
T113B		1	2-1/2	1-1/4	1/2	1-1/2	32.00
T200B	Beading 	1/8	3/4	5/16	1/4	1-1/4	10.00
T201B		3/16	7/8	3/8	1/4	1-1/4	10.00
T202B		1/4	1	7/16	1/4	1-1/4	11.00
T203B		5/16	1-1/8	1/2	1/4	1-1/4	12.00
T204B		3/8	1-1/4	5/8	1/4	1-1/4	14.00
T205B		1/2	1-1/2	3/4	1/4	1-1/4	16.00
T210B		1/2	1-1/2	3/4	1/2	1-1/2	16.00
T212B		3/4	2	1	1/2	1-1/2	20.00
T901B	Cove 	1/4	1	3/8	1/4	1-1/4	11.00
T902B		3/8	1-1/4	1/2	1/4	1-1/4	12.00
T903B		1/2	1-1/2	5/8	1/4	1-1/4	13.00
T904B		1/4	1	3/8	1/2	1-1/2	11.00
T905B		3/8	1-1/4	1/2	1/2	1-1/2	12.00
T906B		1/2	1-1/2	5/8	1/2	1-1/2	13.00
T301B	Roman Ogee 	5/32	1-1/8	15/32	1/4	1-1/4	15.00
T302B		1/4	1-1/2	21/32	1/4	1-1/4	16.00
T303B		5/32	1-1/8	15/32	1/2	1-1/2	15.00
T304B		1/4	1-1/2	21/32	1/2	1-1/2	16.00
T1501B	Slot Cutter 		1-1/4	1/8	1/4	1-1/2	9.00
T1503B			1-1/4	1/4	1/4	1-1/2	10.00
T1506B			1-1/4	1/2	1/4	1-1/2	11.00
T1512B			1-1/4	1/2	1/2	1-1/2	11.00
T601	Core Box 		1/4	1/4	1/4	1	9.00
T602			3/8	3/8	1/4	1	10.00
T603			1/2	3/8	1/4	1	12.00
T604			5/8	5/8	1/4	1-1/8	13.00
T605			3/4	5/8	1/2	1-1/2	14.00
T1602	Dovetail 		1/2	1/2	1/4	1-1/4	5.00
T1604			3/4	3/4	1/2	1-1/2	6.50
T1606			1	7/8	1/2	1-1/2	7.50
T1607			1/2	1/2	1/2	1-1/2	5.00
T2201s	1/4" Straight Bit Single flute Double flute 		1/8	1/2	1/4	1-3/16	5.00
T2202s			3/16	1/2	1/4	1-3/16	5.00
T2205d			1/4	3/4	1/4	1-3/16	5.50
T2207d			3/8	1	1/4	1-3/16	5.50
T2209d			1/2	1	1/4	1-3/16	5.50
T2211d			5/8	3/4	1/4	1-3/16	6.50
T2212d			3/4	3/4	1/4	1-3/16	7.50
T2313	1/2" Straight Bit 		1/2	1-1/4	1/2	1-1/4	5.00
T2317			5/8	1-1/4	1/2	1-1/4	6.00
T2318			3/4	1-1/4	1/2	1-1/4	8.00
T2501B	Cove Beading	3/16	1	1/2	1/4	1-1/4	12.00
T2502B		1/4	1-1/8	9/16	1/4	1-1/4	13.00
T2503B		5/16	1-1/4	5/8	1/4	1-1/4	14.00
T401B	Chamfer	45°	1	3/8	1/4	1-1/4	11.00
T403B		45°	1-3/8	5/8	1/2	1-1/4	12.00
T2004B	Straight Bit w/ Bearing Guide 		1/2	1	1/4	1-1/4	7.00
T2008B			1/2	1	1/2	1-1/4	7.00
T701	V Groove		3/8	1/2	1/4	1	8.50
T702			1/2	1/2	1/4	1	9.50
T2101	Mortising		1/2	13/32	1/4	1	6.00
T2102			5/8	9/16	1/4	1-1/4	7.00
TC-12B	Classical 	3/16	1-3/8	11/16	1/4	1-1/4	18.00
TC-12B 1/2		3/16	1-3/8	11/16	1/2	1-1/2	18.00
TC-16B		1/4	1-5/8	13/16	1/4	1-1/4	19.00
TC-16B 1/2		1/4	1-5/8	13/16	1/2	1-1/2	19.00
T1701	Panel Pilot w/ Drillpoint 		1/4	3/4	1/4	1	6.50
T2601	Keyhole (T.C.T.)		3/8	3/16	1/4	1	7.50

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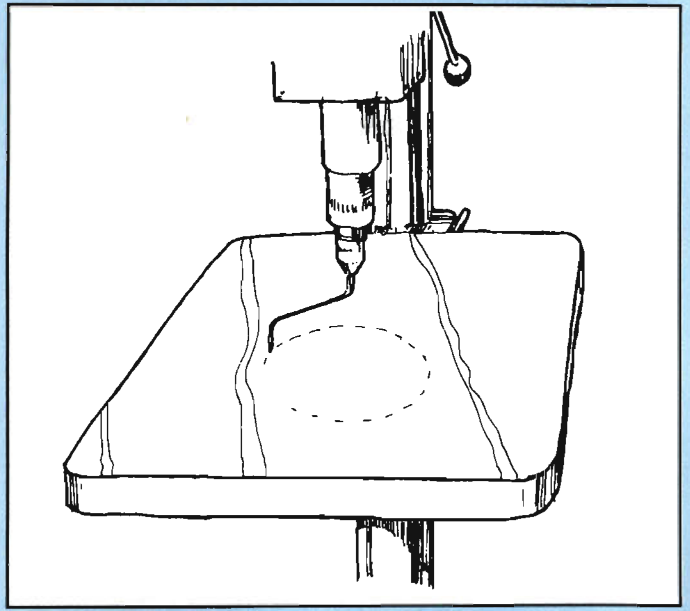
Tricks of the Trade

Drill Press Table Alignment Aid

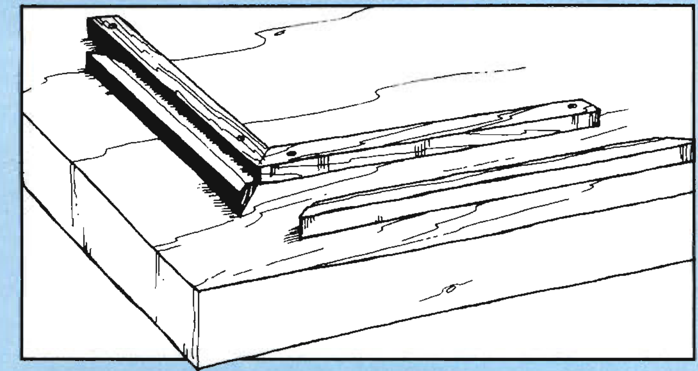
Here's a quick and accurate way of making sure your drill press table is squarely aligned with the spindle centerline. Clamp a stiff wire bent as shown in the chuck, and lift the table so it just clears the tip of the wire. You could use a feeler gauge or sheet of paper to check clearance. Rotate the spindle 180° and check the clearance again. Loosen the table mounting bolt and adjust the table until the clearances are equal.



The same idea works well to check that the shafts of motor and drive equipment are concentric and parallel to each other. Move either shaft until the wire tips rotate concentrically and are equally spaced throughout a full 360° rotation.

Allan R. Nye
San Antonio, TX

Perfectly Square



To make picture frames rapidly and easily, make a wooden form out of scrap 1 X 2 and screw it to your work bench. You can then fit and glue the mitered ends together against the square for a perfect 90° angle. Repeat the process for the other corners.

Don Bowers
St. Johnsville, NY

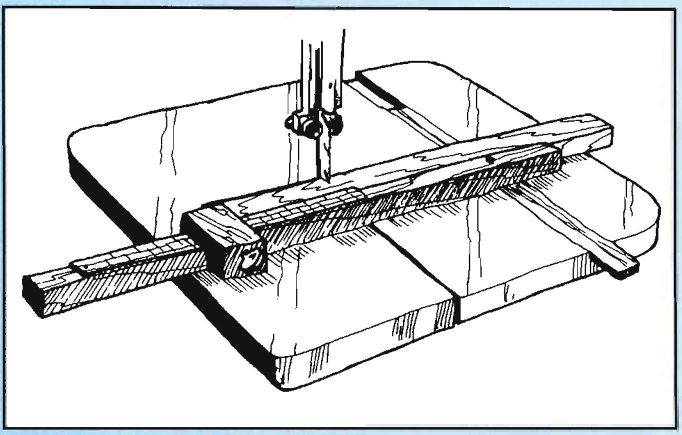
Cutting Short Dowels

To cut short lengths of dowel quickly and accurately—and keep all your fingers—drill a hole slightly larger than the dowel diameter in the end of a piece of scrap stock. The depth of the hole should equal the length of the dowel piece you want. You can then cut even very short pieces on either the table or band saw.

Ken Hill
Springfield, MO

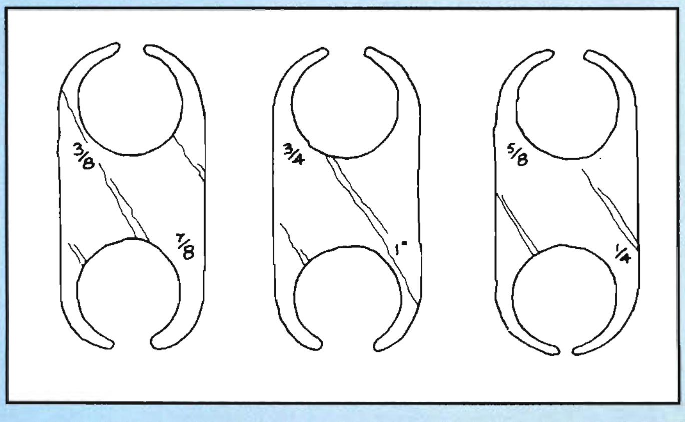
Repeat Cuts on the Band Saw

Making several small pieces that are the same length can be done more safely on the band saw than on the table saw. I cut a strip that rides in the miter gauge slot and attached a 1 X 2 to the top of it at 90°. I glued a ruler onto the 1 X 2 with the zero point lined up with the blade. A U–shaped stop block that has a threaded insert and thumbscrew in one end straddles the 1 X 2 and sets the measurement. The blade does cut into the jig, but this doesn't affect its performance.



Don Kinnaman
Phoenix, AZ

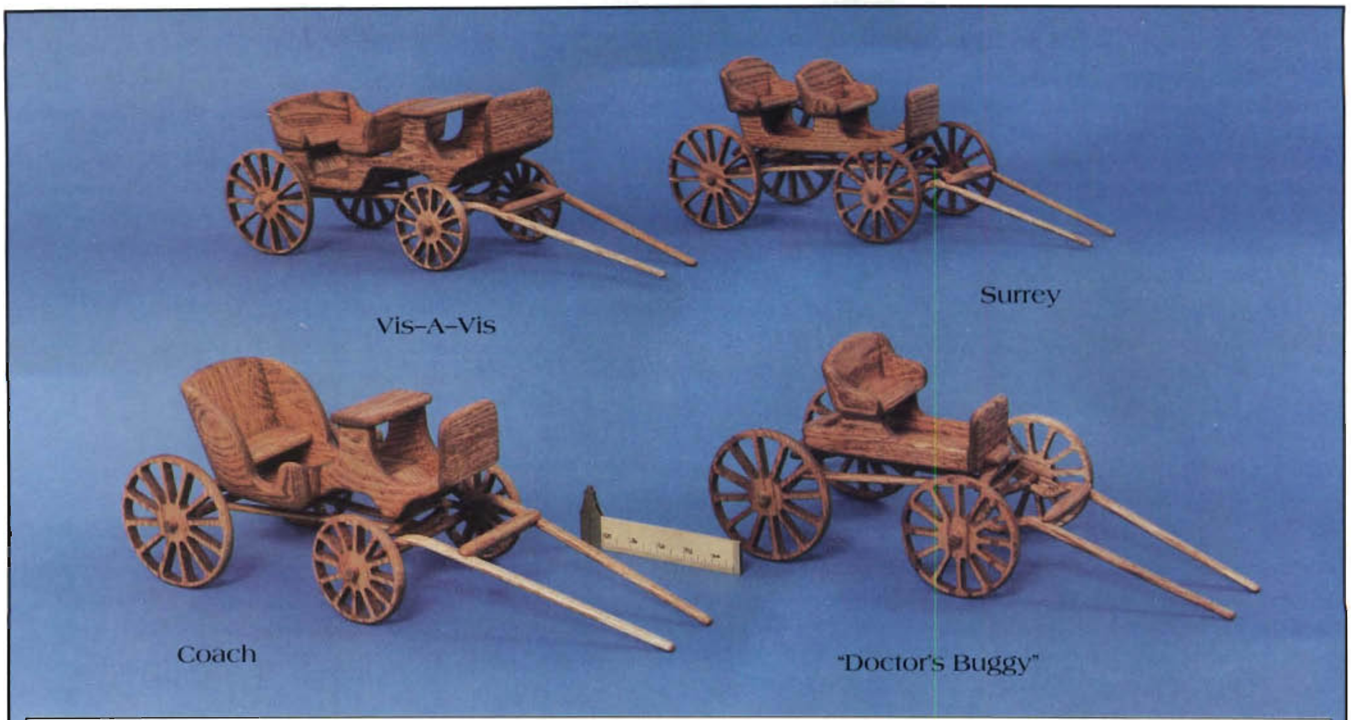
Lathe Gauges



Illustrations by Graham Blackburn

If you're tired of constantly adjusting calipers to check work on the lathe, make a set of these gauges. I used an aluminum alloy a little thinner than my parting tool. Be sure to keep a noticeable difference in the two sizes on each gauge.

Ken Hill
Springfield, MO



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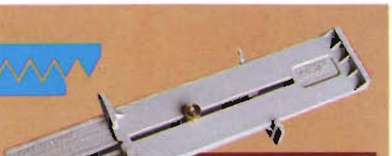

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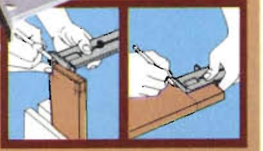
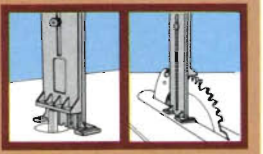
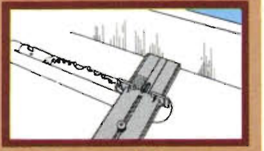

■ Marking Gauge


■ Depth of Cut Gauge


■ Alignment Gauge

■ Center Finder

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Buy It or Build It?

by Ken Sadler

There are only two ways to become self employed—buy an established business or start from scratch and build one. There are some variations on these themes, but basically it comes down to buy it or build it. There are pros and cons to both of these approaches. In general, buying a business is less expensive (thought not always) but takes much more time and investigation. Starting from scratch gives you the opportunity to build it your way. In this article I will assume that you are interested in owning a woodworking business of some kind and will attempt to cover the different angles in some detail so that you will have a base to work from.

Buying A Business

When you first started thinking about a woodworking business of your own, you probably had a rather firm idea of the type of business you wanted. I would caution you not to be too rigid about this. When you start looking for one to buy, you should look at all types; you may find one that you weren't aware of that will arouse your interest. And then, there may not be available any of the type you think you want.

How do you find these businesses? One place to look is in the newspaper classifieds under "business opportunities." (The ones you'll find on the business and financial pages will usually be bigger and more costly than you're probably looking for.) Unfortunately, most of those listed under "opportunities" are anything but. However, a business that looks like a dog at first glance may, after a closer look, turn out to be a bargain that, with hard work and a little additional capital, can turn into a real money–maker.

Another way of finding businesses for sale is to ask around. Ask your friends and acquaintances, and try the bank; they're often first to know that one of their clients wants to sell. Go through the Yellow Pages and look for listings under woodworking or other special headings. Drive around and look at these establishments. If one looks interesting, go in and ask the owner if he wants to sell. The worst thing he can say is no, and he might say yes.

If you find a business you like but the asking price seems to be out of your range, don't be scared off. First, businesses seldom sell for their asking price; and second, the best way to buy is to pay part down and the rest over a period of years, paid out of earnings. In today's parlance, this is known as a leveraged buyout; but on a very small scale.

Once you have found a business that interests you, the first thing you want to look at is the company's annual profit and loss statements for the past four or five years. You will also want the most recent Balance Sheet. The Balance Sheet will tell you what the owner has set as a value for the equipment and what his other assets are. It will also list his liabilities such as accounts payable and loans outstanding. Lastly it will show his net worth, if any. If the owner says he can't give you any figures, it's time to bid him goodbye.

While he's rounding up the figures, take a look at the product. Study how it's being made to see if you think it can be made better, more efficiently, or for less money. Look at the shop; is it neat and clean, or is it a mess? Good products seldom come from messy shops. Is the shop large enough for the work being done or is everything jammed together so that it's hard to move work around and get things done? What is the condition of the equipment, and is it suited to the product that is being made with it? Is there any idle equipment? If so, ask why it's idle. Make a list of the equipment and its approximate age; then go around to some used machinery dealers and see what you would have to pay for it on the open market. You should also try to determine if other products can be made on the equipment. In these days of rapid change, it is dangerous to have your equipment tied to only one type of product.

Check the number of employees in both the office and shop. Does there seem to be more than necessary? Find out how many are relatives of the owner. This will be good to know when you check the wages and salaries on the profit and loss statement. Sometimes members of the family are supported at fancy wages or salaries because these items are deductible as expenses. Notice how hard the employees seem to be working and what their attitude toward their job seems to be. Talk to them, if possible, and try to get their feelings about their job and the company. This information will be very helpful in determining whether you can turn a losing proposition around quickly.

There should be a detailed inventory of raw materials, supplies, and work in progress. It will be a tedious and difficult process, but you must check it to be sure it is accurately stated. Be sure that all the items listed are currently used either in the shop or in the product being manufactured. It will also be necessary to check prices to see that they are accurately stated. The work in progress will be the most difficult and you may wind up negotiating its value if you decide to buy.

The next thing to look into is the product itself. How and where is it being sold? What is this company's place in the market? Are its prices competitive? What is the future of the present product line? Can the line be added to? If the product is being handled by distributors and dealers or if it's sold direct to retail stores, visit these people and ask them what they think of the line and what is their experience with it. Ask them if they have any suggestions concerning it. Ask the owner of the business you are considering buying for sales figures for the last four or five years, including the numbers of each item in the line that were sold. If he cannot produce these

__Ken Sadler__ is a retired custom furnituremaker in Portland, Oregon. He also served for four years as a counselor with the Service Corps of Retired Executives (SCORE), a volunteer organization that advises small businesses through the Small Business Association.

figures, be wary; take more care with your interviews of dealers and stores. This investigation is essential because it is the only way for you to gage the present and future sales potential of the company.

Having asked all the questions, and made all the investigations, you will have a sizeable amount of information. Now comes the hardest and most important part of buying a business: analyzing the information and making the decision.

The first step is to analyze the profit and loss statements. Did the company make a profit? If so, were all wages and salaries—including the owner's—deducted as expenses, or did they come out of the profit? Many small business owners don't understand the difference between salaries, wages and profits. Adequate salaries and wages must be included as expenses of the business, even if they are not taken. Otherwise you will not be able to determine accurate costs and as a consequence your prices will not reflect the true costs of doing business. Profits are what is left over after all reasonable costs have been recorded. It's the wages and salaries you live on and the profits that you grow on. When making your analysis of the P&L statements, it is important to be sure that the company can afford to pay you a salary that will allow you to maintain a reasonable standard of living. If it can't you will need to have money to live on in addition to the money needed to buy the company. This situation is sometimes acceptable if you can buy the company cheap enough and turn it around quickly. The analysis of the rest of your data will tell you if this is so.

If the company isn't making any money, then study the costs to see what may be out of line. There are several things that can cause trouble: too high an overhead, too high material costs, too much labor cost due to inefficient operation. Your study of the figures and the answers to some of the questions you asked, coupled with what you saw in the shop may lead you to feel that the problem can be overcome and the company made profitable. On the other hand if the costs appear to be in line, and failure is due to too low prices and the competition won't let you raise them, then it's a good time to back off.

Don't stint on this part of the process. If you feel you need more information, ask for it or go get it on your own. This decision will be almost as important as deciding to marry and more important than buying a house. Be cautious and go slow. The owner may need to sell, but you don't need to buy—at least not this particular company.

Building A Business

When starting a business from scratch, the first decision you need to make is the same as when buying a business, what type of woodworking operation do you want? As I mentioned, starting from scratch

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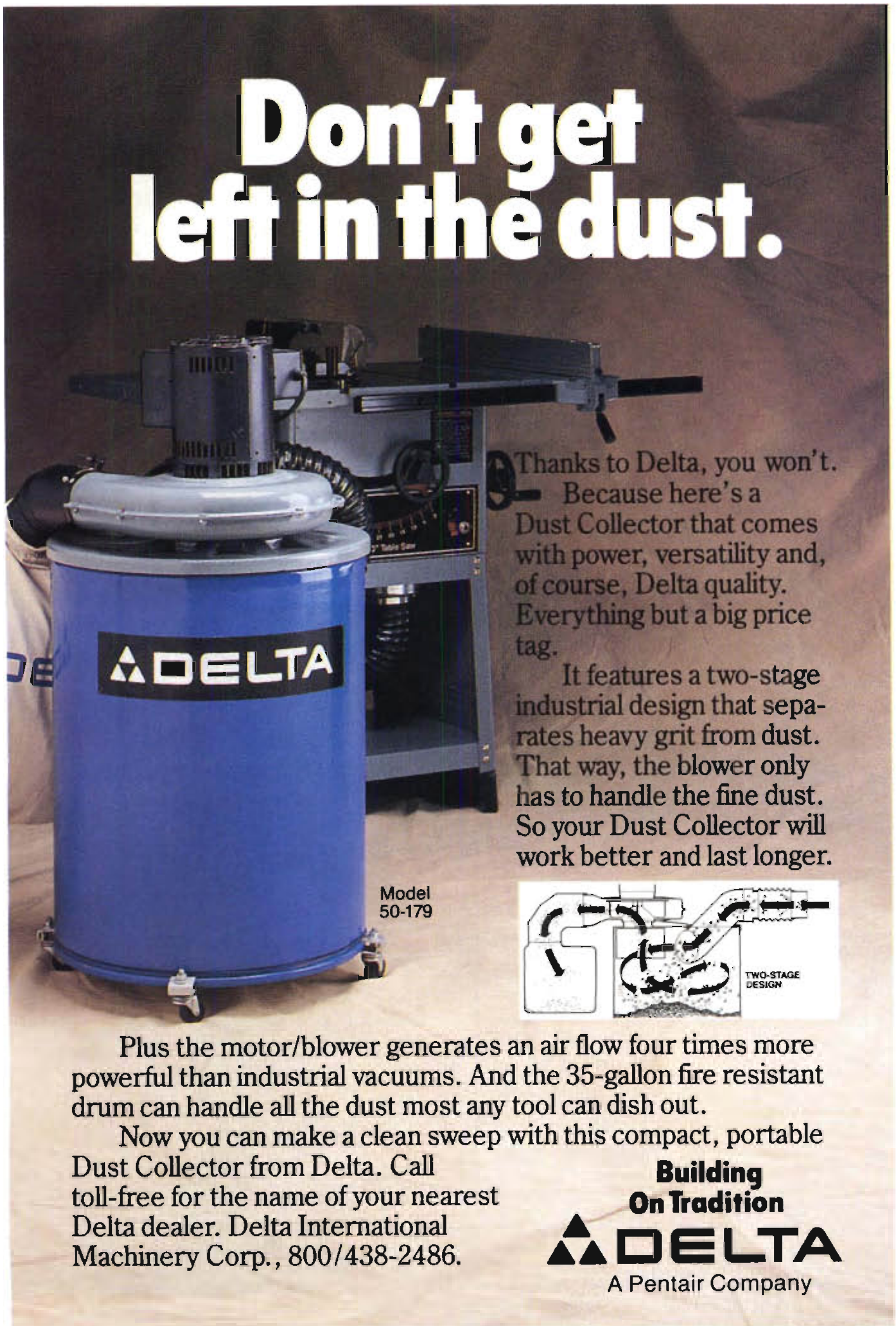
is the more costly of the two methods of getting into business for yourself. There are two reasons for this. First, you must have the money to equip your shop, buy the raw materials and then begin making the product. Second, and at least as important, you need the money necessary to live for at least a year without any money coming in. This is a rule of thumb that I developed during twenty five years of starting my own companies. You will, of course, have money coming in, but experience shows that it takes about three years for a business to earn enough to provide the owner with a reasonable standard of living. Enough money for one year without any income will stretch over the three years that it takes to get over the hump. If you don't have the money, there is a way around the problem: start the business on a part–time basis, and keep your present job. This is difficult, requiring long hours and hard work. Sometimes it is not possible because circumstances may require that you operate your business during the hours your present boss wants you to be working for him. In either case, if the money supply is borderline, it makes for a tough decision. Statistics show that more new business fail for lack of sufficient capital than any other reason.

Having scared you to death and filled you with doubts, I'll tell you that it's not as bad as it sounds; I know, I've been through it three times. I hope, however, that I have made you cautious.

Once you have decided what type of shop you're going to operate, the next step is to decide on the specific product line you're going to make. You'll notice that I said product line. A small shop needs more than one item in order to build enough volume to survive and grow. To help you decide on what to make, it's a good idea to conduct a simple market survey. For example, if you've decided to open a specialty shop, such as custom millwork or custom cabinets, your best bet is to go talk to contractors. They will be your major customers and they will tell you what the market is and who your competitors are. (For more information about other ways to get this essential marketing information, see "The Business End: Selling and Marketing" in *PW* #54, May 1990.)

You will, at this point, need to come to some conclusion as to how you are going to make your products and in what quantities. What equipment will you need to make them, and how much of that equipment do you already have? As to the equipment you will need to buy, can you afford new, or will you have to be content with used? Often you can find very good machinery on the used market at reasonable prices, particularly in the area of table saw, jointers, and such. I have found better quality machines than I could get new, at prices within my budget. A word of caution: buy only the equipment you absolutely need and can keep busy. Money spent on machines you don't really need is money tied up during the months or years when you will need as much working capital as you can get.



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The Business End

Creating a sales policy is perhaps the most important step in the whole process. The best production equipment and methods are of no avail if you don't sell what you make. Depending on the product, the small woodworking shop has three main avenues to the consumer: selling through gift and similar small stores, direct sales, and mail order. Notice that I did not say direct mail. There is a big difference between mail order and direct mail, and the latter is far too expensive for a small shop. Each of these avenues has its pros and cons. Again, in the May 1990 issue of this magazine I covered this subject in some detail. Keep in mind that the sales policy you set at the beginning is just that, a beginning. You can and probably will change it several times as you prosper and grow, but you must have a definite policy to guide you right from the start. A hit or miss approach can bring disaster.

Finally, you will need to set up an accounting system and some kind of production record system. For the accounting system it would be best to get the help of an accountant. Be sure that the one you get understands cost accounting and sets up your system based on it. A cost system used properly for cost analysis is the only way you can keep on top of what is happening in your business. Many businesses get into trouble because they don't spot the trouble soon enough. Cost analysis helps you do this; furthermore, it gives you the tools to accurately set your prices.

A production record system is necessary in order to get the information needed by the cost accounting system: how much material goes into the product and how much time is spent producing it. You will also need to know the supplies used and time spent that are not part of the product. These figures are called overhead, and they are a cost that has to be reckoned with. Once you have the basic cost system in mind, you can work out estimates of the cost to make your products and from that determine tentative prices. Take these back to the various sales outlets you have already contacted, and compare them with your competitors' prices. If you're not competitive, look first at your costs to see if they can be cut; if not, you'd better find another product. Take care with this analysis and do it before you spend money on establishing a shop. It may save you a lot of grief and money.

When you have done the things I have mentioned you will have the information necessary to make an informed decision on whether you want to start your own business and whether you want to buy it or build it. PW

* * *

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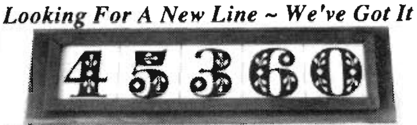

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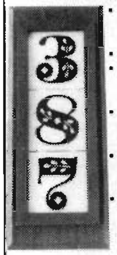

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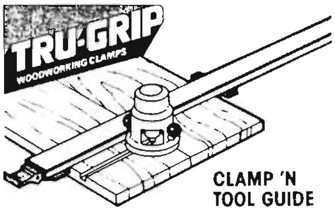

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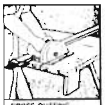

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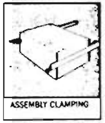

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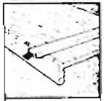

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Questions and Answers

Refinishing Burned Furniture

Our cabin recently burned down. Fortunately we were able to rescue some of our furniture. However, the smoke and heat damage was extensive. The soot layer was easily removed with alcohol, but since the wood beneath remained discolored, we discontinued the process. The pieces we are most concerned with were finished in Danish oil, and the woods involved are maple, applewood, mahogany and sycamore. Could you please advise as to the restoration of this furniture.

Peg Klouda, Anaconda, MT

You will find that your repair efforts must match the extent of the damage. So, the first step is to remove the finish and if necessary, sand the wood until you reach a clean unstained surface.

If the damage consists only of a black layer of soot, careful washing with a good detergent or with alcohol as you did will bring back the original beauty of the wood, and then all that needs doing is a thin coating of the original finish.

If the finish is damaged superficially, a fine sanding with wet and dry sandpaper will eliminate the slightly charred or discolored layers and once cleaned they can be refinished with new coatings.

If the major part of the finish is gone, the only answer is a thorough job of removing the balance of the finish, followed by application of a new finish. If the surface of the wood itself is charred or scorched, you must face the fact that there is no trick or chemical that can bring charred wood back to its natural state, only hard work will do this. All charred particles must be scraped or sanded away; then can you successfully refinish.

George Frank

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Some eight years ago we finished a maple floor in our kitchen with heavy duty Fabulon® (lacquer base, I think). It has given us remarkable service.

Recently I built cupboards from applewood. I cut the logs, dried the lumber for about three years, and made panelled doors and solid drawer fronts. I finished them with lots of sanding, then Fabulon® (both sides). Within months the finish began to peel slightly, not coming off, but turning white in streaks on the rear edges, and at knots and figures.

The cupboards were a labor of love, and now I want to refinish them properly. Have you a prescription?

J. E. Curtis, Ontario

Since the finishing product performed to your satisfaction on one wood and not on the other, the problem must be in or on the wood.

In the wood is the greatest probability. The wood probably contained too much moisture at the time you finished it, and the escaping moisture separated the finish from the wood. If such was the case, the only remedy is a complete refinish. However, after washing off the present finish and before applying the new coating, take some pieces to a local lumber yard, and ask them to determine the moisture content of the wood. It should be about 7%. More than that and the wood needs further drying.

Another possibility is that you left fine sawdust on the wood after sanding and then finished over this dust. That fine wood powder would cause the finish to separate from the wood as you described.

George Frank

***George Frank** trained in the great wood finishing shops of Europe and ran his own shops in Paris and New York. He is the author of* Wood Finishing with George Frank *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810).*

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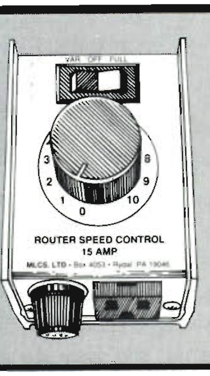

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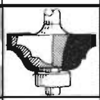
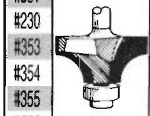
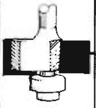
#490		1¼" **Classical**	3/16" R		1¼"	5/8"	¼"	$22.50
#491		1½" Classical	¼" R		1½"	¾"	¼"	$25.00
#792		1½" Classical	¼" R		1½"	7/8"	½"	$25.00
#231		5/32" **Roman Ogee**	5/32" R		1¼"	15/32"	¼"	$17.00
#232		¼" Roman Ogee	¼" R		1½"	¾"	¼"	$18.00
#661		¼" Roman Ogee	¼" R		1½"	¾"	½"	$21.00
#340		1/8" **Cove**	1/8" R		5/8"	3/8"	¼"	$12.00
#341		¼" Cove	¼" R		1"	½"	¼"	$13.00
#342		3/8" Cove	3/8" R		1¼"	9/16"	¼"	$14.00
#343		½" Cove	½" R		1½"	5/8"	¼"	$15.00
#644		¾" Cove	¾" R		1⅞"	¾"	½"	$28.00
#350		1/8" **Round Over**	1/8" R		¾"	3/8"	¼"	$11.00
#351		3/16" Round Over	3/16" R		7/8"	½"	¼"	$11.00
#230		¼" Round Over	¼" R		1"	½"	¼"	$12.00
#353		5/16" Round Over	5/16" R		1⅛"	½"	¼"	$14.00
#354		3/8" Round Over	3/8" R		1¼"	5/8"	¼"	$15.50
#355		½" Round Over	½" R		1½"	¾"	¼"	$17.00
#656		¾" Round Over	¾" R		2"	7/8"	½"	$21.00
#370		3/8" **Rabbeting**	3/8" Deep		1¼"	½"	¼"	$14.00
#670		3/8" Rabbeting	3/8" Deep		1¼"	½"	½"	$14.00
#366		1/8" **Slot Cutter**	3/8" Deep		1¼"	1/8"	¼"	$14.00
#368		¼" Slot Cutter	3/8" Deep		1¼"	¼"	¼"	$14.00
#403		3/8" **Dovetail**	9 degree		3/8"	3/8"	¼"	$ 7.50
#405		½" Dovetail	14 degree		½"	½"	¼"	$ 8.50
#409		¾" Dovetail	14 degree		¾"	7/8"	¼"	$10.50
#709		¾" Dovetail	14 degree		¾"	7/8"	½"	$10.50
#402		3/8" Dovetail	8 degree	For	3/8"	½"	¼"	$12.00
#404		½" Dovetail	8 degree	Leigh	½"	13/16"	¼"	$12.00
#708		1 1/16" Dovetail	8 degree	Jigs	1 1/16"	1"	½"	$14.00

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#416		3/8" Core Box	round nose	3/8"	3/8"	¼"	$11.00
#417		½" Core Box	round nose	½"	11/32"	¼"	$14.00
#418		¾" Core Box	round nose	¾"	5/8"	¼"	$15.00
#719		1" Core Box	round nose	1"	¾"	½"	$18.00
#470		¼" **Straight**	plunge cutting	¼"	¾"	¼"	$ 7.00
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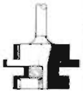
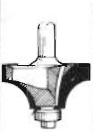
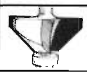
#472		3/8" Straight	plunge cutting	3/8"	1"	¼"	$ 7.00
#473		7/16" Straight	plunge cutting	7/16"	1"	¼"	$ 7.00
#474		½" Straight	plunge cutting	½"	1"	¼"	$ 7.00
#775		½" Straight	plunge cutting	½"	2"	½"	$14.00
#478		5/8" Straight	plunge cutting	5/8"	1"	¼"	$ 8.00
#479		¾" Straight	plunge cutting	¾"	1"	¼"	$10.00
#781		1" Straight	plunge cutting	1"	1½"	½"	$12.00
#500		3/8" **Flush**	**Trimming**	3/8"	½"	¼"	$ 7.00
#502		½" Flush	Trimming	½"	½"	¼"	$ 7.50
#503		½" Flush	Trimming	½"	1"	¼"	$ 8.50
#804		½" Flush	Trimming	½"	1 3/16"	½"	$ 9.00
#545		**Tongue & Groove**	Straight	1⅝"	1"	¼"	$29.00
#845		Tongue & Groove	Straight	1⅝"	1"	½"	$29.00
#546		Tongue & Groove	Wedge	1 3/16"	1"	¼"	$29.00
#846		Tongue & Groove	Wedge	1⅝"	1"	½"	$29.00
#450		1/8" **Beading**	1/8" R	¾"	3/8"	¼"	$11.00
#451		3/16" Beading	3/16" R	7/8"	½"	¼"	$11.00
#233		¼" Beading	¼" R	1"	½"	¼"	$13.00
#453		5/16" Beading	5/16" R	1⅛"	½"	¼"	$14.00
#454		3/8" Beading	3/8" R	1¼"	5/8"	¼"	$15.50
#455		½" Beading	½" R	1½"	¾"	¼"	$17.00
#375		**45 degree Chamfer**	45 degree	1½"	5/8"	¼"	$15.00
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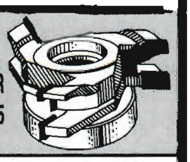

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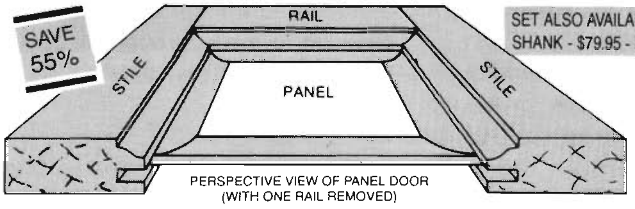

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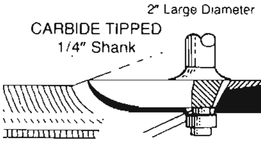

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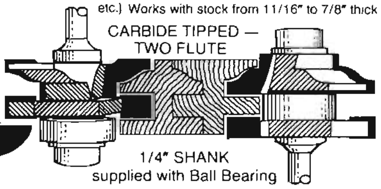

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Book Reviews

by Hugh Foster

More Proven Shop Tips by Jim Richey, editor, ©1990 (The Taunton Press, Inc., 63 South Main St., Box 355, Newtown, CT 06470) 87 pp., paperback, $7.95

This new installment in the *Fine Woodworking On* series features Jim Richey's selection and illustration of topics from his magazine's "Methods of Work" column. It consists of the best entries from 1985 through the near present. There are tips, jigs, and projects here in fourteen classes ranging from "Benches and Vises" to "Odds & Ends." Even better than the original entries in the magazine, those that needed correction or further emendation have all been updated. This is the kind of book that serious woodworkers go back to time and again. After you read your copy, you're almost certain to keep this book in the shop. Highly recommended.

Contemporary Woodworking Projects by Paul Levine, ©1986 (Madrigal Publishing Co., 517 Litchfield Road, Box 1629, New Milford, CT 06776) 165 pp., $14.95

This book's main claim to attention appears to be the "knuckle joint," a through mortise and tenon joint whose edges have been rounded over with a router bit. It is an attractive joint, most effective with contrasting woods, but once you notice that, most of the designs showcasing the joint seem otherwise pretty ordinary, and you realize that you probably don't want a whole roomful of this furniture. Levine's dining room suites are far finer, picking up roughly where most Scandinavian designs leave off. His tables, wall–hung buffets, and the like are indeed handsomely made. Of greatest interest, I suspect, may be the quick tips. In just a couple of pages Levine shows how to make tambour doors and a variety of lattice work projects which would make excellent gifts.

Projects for Woodworkers: 75 Project Plans for Furniture, Toys, and Accessories, Volume I by the editors of The Woodworker's Journal, ©1987 (Madrigal Publishing Co., 517 Litchfield Road, Box 1629, New Milford, CT 06776) 117 pp., paperback, $10.95

Here's a collection of projects published about nine years ago in The Woodworker's Journal. The index divides the 75 projects into bed/ bath, bookcases/shelves, boxes/ containers, chairs/stools, children's furniture, clocks, cupboards/cabinets, decorative/ornamental, desktop/office, household, kitchen, outdoor accessories, personal accessories, tables/desks, toys/games, and workshop. Each project is accompanied by one or more photos, a perspective drawing highlighting construction features, assembly drawings, well–organized cutting lists, and a succinct text. I believe an "advanced novice" could build any of the projects. You're likely to find this one useful.

Build–It–Better–Yourself Storage Around the House, by the editors of *Rodale's Practical Homeowner* magazine, ©1988 (Rodale Press, 33 East Minor St., Emmaus, PA 18049) 283 pp., $19.95

Rodale has been publishing Build–It–Better–Yourself books for over a decade. This one presents projects that will help us acquisitive Americans organize our clutter so that our homes will be habitable. They range from a very simple spice rack to a very complicated sewing center. Exploded–view drawings and many photos help keep most of the projects within reach of novices. There are projects here for every room of the house, from bath to garage, and if you scan the book for even a few minutes, you're sure to find something that will make your life more orderly.

Build–It–Better–Yourself Country Furniture, by the editors of *Family Handyman* magazine, ©1987 (Rodale Press, 33 East Minor St., Emmaus, PA 18049) 341 pp., $21.95

There are over ten dozen plans here—country style, including some Shaker–influenced designs—in four sections: tables and desks; chairs, benches and beds; cabinets and storage units; accents and accessories. The text is highly condensed, almost too terse for clarity, but the photos, exploded–perspective drawings and detailed cutting lists are excellent. The editors point out that regardless of the methods suggested for particular tasks, we should work the way we want to, the way that's familiar to us, the way we'd make them anyhow. In other words, the book offers handsome furniture, made to be used, rather than collector heirlooms. If you can't find a project or twelve here that you'd like to make, it's your fault, not the publisher's. I intend to circulate this book among my furniture–buying clientele and order a couple hundred board feet of cherry while I wait.

Colonial Classics You Can Build Today: Plans and Drawings for 80 Authentic Projects, All Exact Replicas of Early American Antiques by John Nelson, ©1986 (Stackpole Books, Cameron and Kelker Streets, Harrisburg, PA 17105) 255 pp., paperback, $19.95

I don't really much like Early American furniture, but I liked this book from the moment I picked it up. Like Thomas Moser's classic *How to Build Shaker Furniture* (Sterling, 1977), this book opens with just over 50 large format pages of sensible, well–illustrated advice on how to build any project, and then goes on to show the projects by categories. And like Moser's book, this one is so simple, so elegant, and so clear that it is bound to become a classic, too. Nelson arranges his projects as Antique Shelf or Counter Projects, Antique Wall Projects, and Antique Floor Projects. The latter includes a variety of stools and benches, a podium, excellent saw horses, dry sinks, chairs, chests, wash stands, formal pieces, cupboards, and tall case clocks. A useful Appendix discusses supply sources and further items of "antique" interest. There are few photos, but the folksy drawings are numerous and pleasant. Overall, the book is most satisfying. Search this one out—it's worth the effort.

Treasury of Woodcarving Designs by Alan and Gill Bridgewater, ©1981, 1988 (Sterling Publishing Co., 387 Park Avenue

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***Hugh Foster** is a part-time furniture designer/ builder in Manitowoc, Wisconsin and the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*

South, New York, NY 10016-8810) 192 pp., paperback, $12.95

Previously published in hardcover by Van Nostrand Reinhold, this collection of well over a thousand designs should serve not only as an inspiration to carvers, but as a thought–provoking essay on the varying attitudes of different national and ethnic traditions. After a very brief overview of carving traditions, the book profusely illustrates designs in the categories of lines, circles, twined forms, plant forms, and animal forms. Just by studying the drawings and photos, one can sort out notions about the nature of being human and living in a particular time and place; the book has an anthropological as well as craft use. Get this one.

Woodcarving Patterns from Around the World by E. J. Tangerman, ©1989 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 192 pp., paperback, $12.95

"Tangey" has been well known to readers of carving books and magazines for many, many years. His experience and expertise show in this handsome volume containing thousands of patterns from many cultures. One panel of nature studies has 147 distinct figures. Variety abounds—you'll find Christmas ornaments, a war club and even a carving of an M. C. Escher eye–teaser. The carvings are both relief and three–dimensional, and some of the patterns should be of interest to scroll sawyers as well. At first, a sense of *deja vu* disturbed my reading—I had seen it all before, somewhere. But Tangey's style saves the book, and no one has seen this much in one volume before. While there isn't lots of instruction here, the book is easily worth its weight in inspiration. PW

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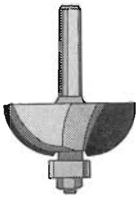

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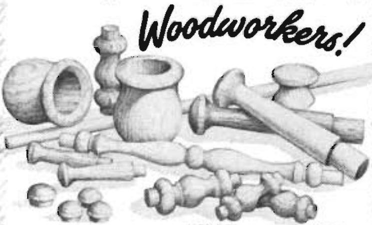

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Videoscene

by Alan Marks

Carving Swedish Woodenware with Jögge Sundqvist, ©1990 Taunton Press, Box 5506, Newtown, CT 06470-5506, 60 minutes, $29.95

Watching this video transported me back twenty years to Sweden where I was a beginning student at Malmsten's ***verkstadsskola*** (workshop school) and we were told by the master himself how important he considered carving with a knife. Malmsten believed that carving wooden utensils with a knife and other simple tools developed in the craftsman a simultaneous awareness of form, of the strengths, limitations, and character of wood, and of the suitability of an object to the task it has to perform.

That Malmsten, a furniture designer of considerable talent and sensitivity, strongly recommended such a humble exercise made quite an impression on us students. Some gave it a try. My own experiences in carving utensils confirmed the wisdom of his recommendation in every respect.

A book, in paperback at $15.95, entitled *Swedish Carving Techniques* accompanies the video as an option and is written by Wille Sundqvist, Jögge's father. More about the book later.

The tape will show you the complete creation of a "dough bowl," from splitting a log through applying linseed oil to its smoothed surface. For this, the tools used are the hewing axe, the adze, the gouge and the drawknife. Dough bowls were used for kneading dough and can be used for decoration or for fruit or salad as well. They have very attractive proportions.

The second project demonstrated is the making of a spoon. It must be made from a piece with the proper curve; this is usually found in the crook formed where branches join. The dimensions of the timber required are small, and you won't find the necessary material at a lumber yard. It will have to come from a tree branch or from a large bush, and you will have to cut and dry it, or else work it green and then dry it. Here, the knife is the tool of choice, though roughing out may be done with an axe.

Some of the knife grips the Sundqvists demonstrate were foreign to me, and if not for them, I would have thought that learning to handle a carving knife was a matter of instinct and common sense. It takes only one or two painful lacerations before the neophyte learns to anticipate trouble and avoid it. Hopefully, he learns at the same time to maximize leverage and cutting stroke length, in the interests of efficiency.

I found no fault with Jögge Sunqvist's presentation. It would, however, be an exaggeration to equate in value what he shows to the broad scope covered in his father's book. Actually, the video's only contribution, in my opinion, is to demonstrate in animated form the various strokes and grips covered photographically in the book. It might save learning time to watch this video, but I can't really say it is essential or adds additional information. This is one case where I would have to recommend the book over the video and I would *even go so* far as to say the book is a better deal.

Small Shop Projects:Boxes with Jim Cummins, ©1990 Taunton Press, Box 5506, Newtown, CT 06470-5506, 60 minutes, $29.95

Like everyone, I feel bad about abandoning those beautiful odd scraps of leftover wood to the firewood pile. You know, the little ones with the terrific grain? This tape offers a suggestion: make them into small boxes.

Jim Cummins runs a picture-framing shop, and he used to be an editor with *Fine Woodworking* magazine. He made a previous video entitled Small Shop Tips and Techniques. Time-saving jigs, and clever solutions to the production needs of the small shop seem to fascinate him and his preoccupation with such *matters* is obvious in this tape as well.

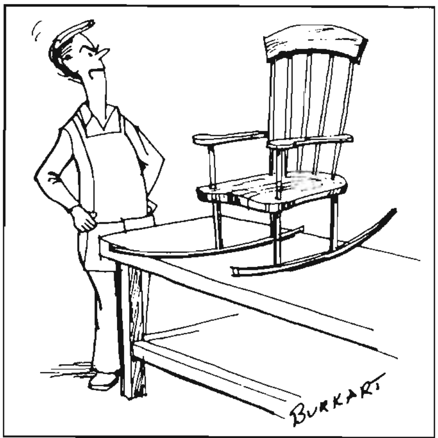
It primarily shows how to make boxes with mitered joints—a skill no doubt developed by his being a picture framer. Most of the boxes he demonstrates are geometrically unconventional; eight-sided, six-sided, twelve-sided—even one which has thirty-one sides. He has worked out clever methods for doing these joints accurately and one of his demonstrations shows how to calculate the angles involved. So many clever tips are offered that, even if you don't make a dodecahedron box, you may learn a lot which you can use elsewhere.

He also explains a technique for cutting the joints, which allows the figure to run continuously around all the sides of a box.

I was delighted to see the personality of the author/instructor shine forth. Cummins' at times wry commentary and sense of humor, particularly in the booklet which accompanies the tape, humanizes his teaching. He never purports to be an authority in his field and points out his many errors and miscalculations along the way. This is good to a certain point, but on one occasion, he seemed to waste a lot of time showing how he disguised a serious glue-up error. He could just as easily have cautioned the viewer to avoid making it to begin with.

All in all, this tape would be a valuable addition to your video library. PW

***Alan Marks** designs and makes furniture and cabinets in Carmel Valley, California, and is a Contributing Editor to PW.*



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Tried and True

by Graham Blackburn

Block, Miter, Bullnose & Chariot Planes

Here's a group of planes related to each other only by virtue of their handiness—they are all small and function in certain respects as miniature block planes.

Block Planes

The best known of the four types and the newest, the block plane is the metal development of the venerable miter plane. First introduced in the last century as a small miter plane, it was soon adopted by almost every woodworker. Small enough to be held and operated in one hand, and possessing an iron set at a much lower angle than regular bench planes (such as smoothers, jacks and jointers), it rapidly became popular as a convenient "apron tool"—one you can carry around in a pocket and use for many small jobs (Figure 1).

It was the metal planemaker's delight, and despite its small size and single iron, varieties with all sorts of improvements soon appeared. Even today, when most other planes exist in only one basic form, it's still possible to buy three or four different varieties of new block planes.

Miter Planes

The miter plane is descended from an earlier form of plane common since the Middle Ages—a cutting iron set in a block of wood. The miter plane (Figure 1) developed from this proto–plane to meet the need for a tool to produce fine work on hardwoods and endgrain, such as occurs at miters. Although they were once the most expensive and cherished of planes, they're no longer made. One of the last to be manufactured, the Stanley No. 9 (Figure 1)—erroneously called a cabinet maker's block plane—is among the most expensive and sought after. A far better buy would be any of the European miter planes commonly found at tool auctions. These sell for much less and are superior in every way.

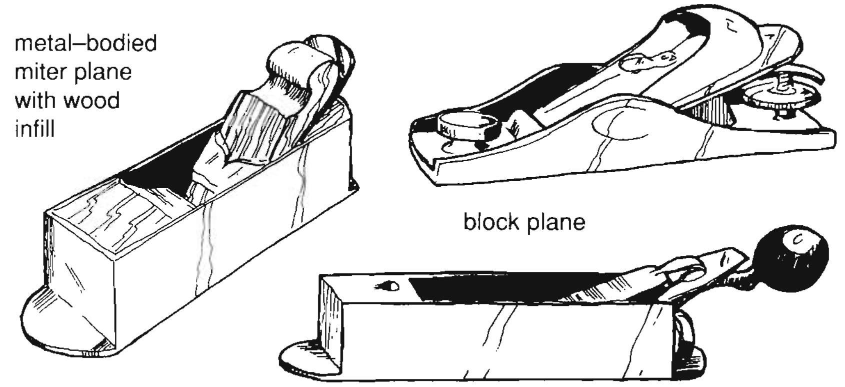

metal–bodied miter plane with wood infill
block plane
the Stanley No. 9

Figure 1. Three Planes

Bullnose Planes

Bullnose planes are now all made of metal and commonly have very low–angle irons. They were all made of wood originally, with irons set at much higher angles (Figure 2). Both types share the feature of the cutting iron set close to the toe so you can use them to fit and clean up small rabbets and chamfers. Do not be confused by the fact that other types of planes can be designed with bullnose features (like a cutting iron very far forward) but still remain rabbet, shoulder, or whatever variety of plane they may be.

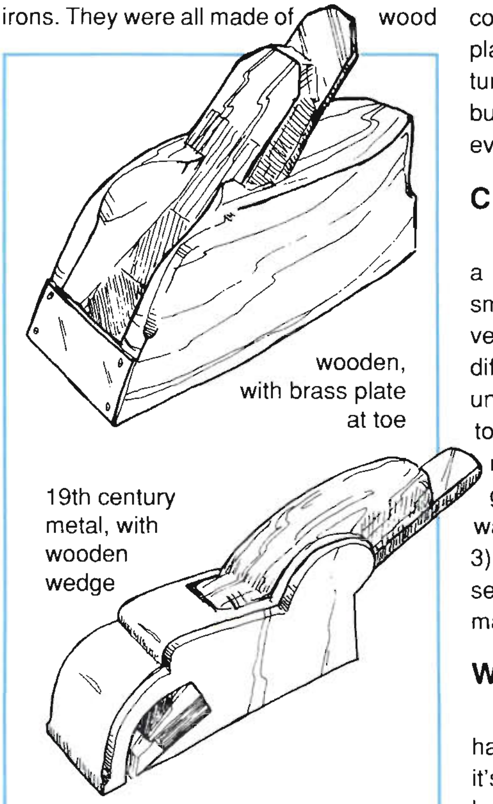

wooden, with brass plate at toe
19th century metal, with wooden wedge

Figure 2. Bullnose Planes

Chariot Planes

My personal favorite, chariot planes are a kind of combination small block and small bullnose plane. Both wood and metal versions were once common, and although different, they were both characterized by unique shapes. The wooden ones are said to resemble Persian slippers, whereas the metal ones are miniature versions of the grand, stuffed panel planes common towards the end of the last century (Figure 3). Both have moderately low–angled irons set fairly far forward. Metal ones are also made with variously–shaped soles.

Which Block Plane to Use?

Undoubtedly every woodworker should have some form or other of block plane—it's simply too useful to be without. But knowing what the choices are, as well as what the other three types can do will enlarge your woodworking "vocabulary"

Graham Blackburn *is a furniture designer and maker in Rio del Mar, California and author of many books on woodworking and home maintenance including* A Home for All Seasons.

and simplify many previously awkward jobs.

All block planes have a low–angled cutting iron, the better to deal with endgrain. As this angle was lowered in early models, workers found that it was no longer practical to make the grinding angle any more acute—the acuter the angle the sharper the edge, but the more quickly it wears and the more vulnerable it is to damage. However, by reversing the iron so that the bevel was now on top, the angle of the cutting iron *could be* lowered even more. This means that it's no longer possible to fit a capiron (useful for strengthening the extreme edge and breaking the shaving).

When choosing a block plane, new or old, be aware that different pitches are available. Although the lower the pitch the easier the plane will work endgrain, the plane must be well–enough made so that the cutting edge end of the iron is supported as close as possible to the edge by the plane's body.

This part of the plane is known as the bed, and it should be well cast so that it not only extends as closely as possible to the edge of the cutting iron, but is smooth and truly flat. I can't emphasize this point enough. For a block plane to work well (shavings as thin as .001") the iron must be properly sharpened, firmly supported close to its edge, and firmly held on its bed with no rocking, otherwise chattering will occur—the bumpy, ripple effect that badly tuned planes often suffer from.

The top–of–the–line modern Stanley block planes have beds that extend quite far to a nice V–shaped front edge, although frequently a little dressing (light filing) is needed to ensure perfect flatness. Many older planes have beds that finish abruptly too far up the iron to be of any help in supporting the iron.

The mouth size is also important in the plane's overall ability to take fine, smooth shavings. Strictly speaking, "mouth" usually refers just to the part of the opening in the sole in front of the cutting iron. Its width helps determine the thickness or thinness of the shaving. If the mouth is too wide, simply reducing the set of the cutting iron will not necessarily produce a thin shaving. This is because under certain conditions—as when planing grain that runs away from the plane—even a thin initial cut produced by a lightly set iron can run ever deeper into the stock (Figure 4). Preventing this was one of the reasons for the development of the double iron—the combination of cutting iron and capiron—since the capiron tends to turn back the shaving as it enters the mouth, breaking it and preventing it from becoming thicker as the cutting iron is pushed through the wood. But the block plane has no capiron! Therefore it's extremely important to ensure that the plane's mouth is as narrow as possible if you intend to take the finest shavings.

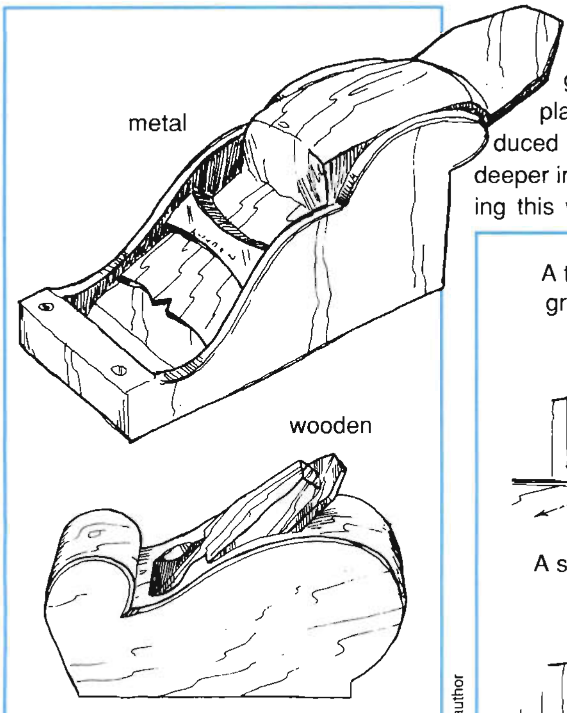
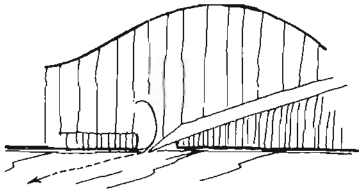


Figure 3. Chariot Planes

illustrations by the author

A thin shaving taken with the grain can grow in thickness.



A small mouth helps keep the shaving thin.

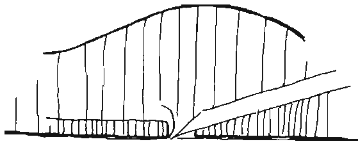


Figure 4. Plane Facts

Since you may not always want to take the thinnest shavings, a block plane with a very small but fixed mouth may not be appropriate. Examine the mouth size of any plane you're thinking about buying. Cheaper planes tend to have unusably large mouths; better quality ones often have adjustable mouths.

Lastly, consider the ease and accuracy of iron adjustment. Cheap models have their irons fixed in place with a simple screw or lever. While this may hold it securely (though often it doesn't), and even if the bed and mouth are adequately formed, the difficulty of setting the iron to precise depths—and keeping it perfectly aligned—can be impossibly frustrating. You might think that any plane fitted with an adjustable setting mechanism, such as the wheel and fork on some Stanleys, would solve the problem, but many of these mechanisms are unbearably sloppy.

You might also want to consider the various specialty block planes that can be a great help in cleaning up high quality work. One example is a block plane that allows two placements of the iron: one results in the standard design, the other puts the iron close to the front of the sole, effectively creating a form of bullnose block plane, ideal for coming close against obstructions (Figure 5).

Another example, long dropped from the Stanley catalog, but now made by another company, is the skewed–iron rabbet block plane (Figure 6). One side of the stock is removable so the plane can be worked right into a corner. The skewed iron makes possible a smooth cut when working across the grain; this, plus the plane's ability to work like a rabbet plane, makes it a handy panel raiser, or panel–raising cleanup plane.

The Aristocratic Miter Plane

The miter plane was surely the aristocrat of low–angle planes. Used with a miter shooting block (see Popular Woodworking #44), this plane with its very low angle iron and extremely thin mouth was capable of exquisite work. While the Stanley No. 9 commonly sells for around $1000, far better dovetailed steel–bodied and rosewood–stuffed European models may be found for as little as $100 to $200. As a finishing plane for the ends of exposed dovetails and other endgrain, it has no equal and should be part of every serious woodworker's kit.

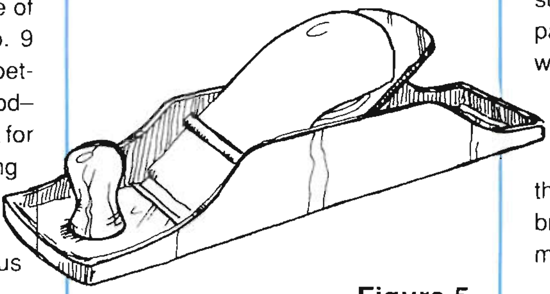

The iron and capiron may be
inserted at the other end
of the body for use as
a bullnose plane

Figure 5.
Double–Ended Block Plane

The Bullnose Family

Nowadays a bullnose plane is little more than a metal combination rabbet–shoulder–block plane, and a poor compromise of all three. The original coffin–shaped wooden tool has all the finesse of a good quality wooden smooth plane, with the added advantage of an iron set virtually at the front of the stock. It can be used over large surfaces and set to take fine shavings with no chatter. Modern metal versions, while possessing the dubious advantage of irons that extend to both sides of the sole (as in rabbet planes), are very narrow and invariably require such a substantial nosepiece in front of the iron as to render them almost useless for the job they are supposedly designed for—planing into corners!

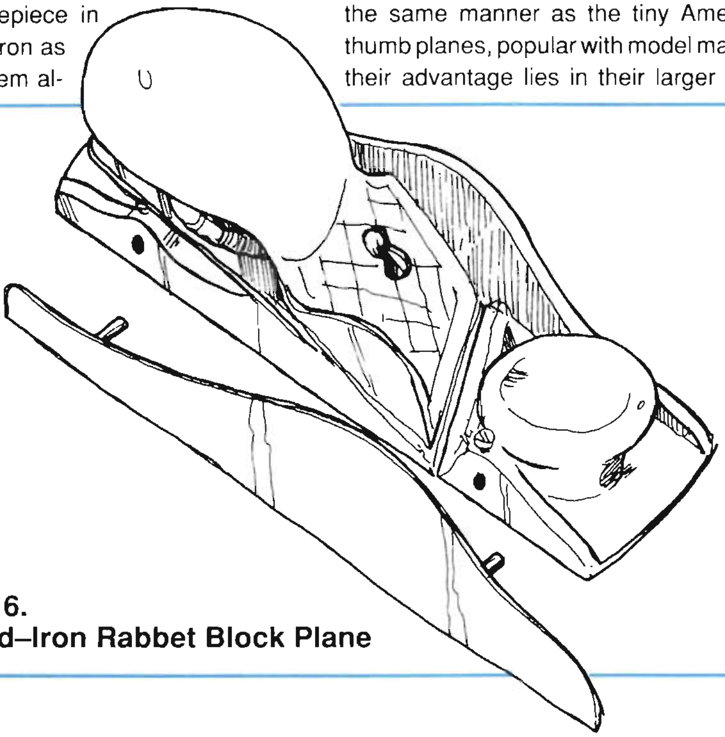


Figure 6.
Skewed–Iron Rabbet Block Plane

Illustrations by the author

Swing Low Sweet Chariot

Most chariot planes are from 3" to 5" long with the iron set so far forward that often the front part of the sole is a separate L-shaped piece fixed to the toe by screws. The so–called Irish pattern is longer (about 9") but is still recognizable as a chariot plane by the characteristic bulbous wooden wedge used in the metal–bodied forms (Figure 3).

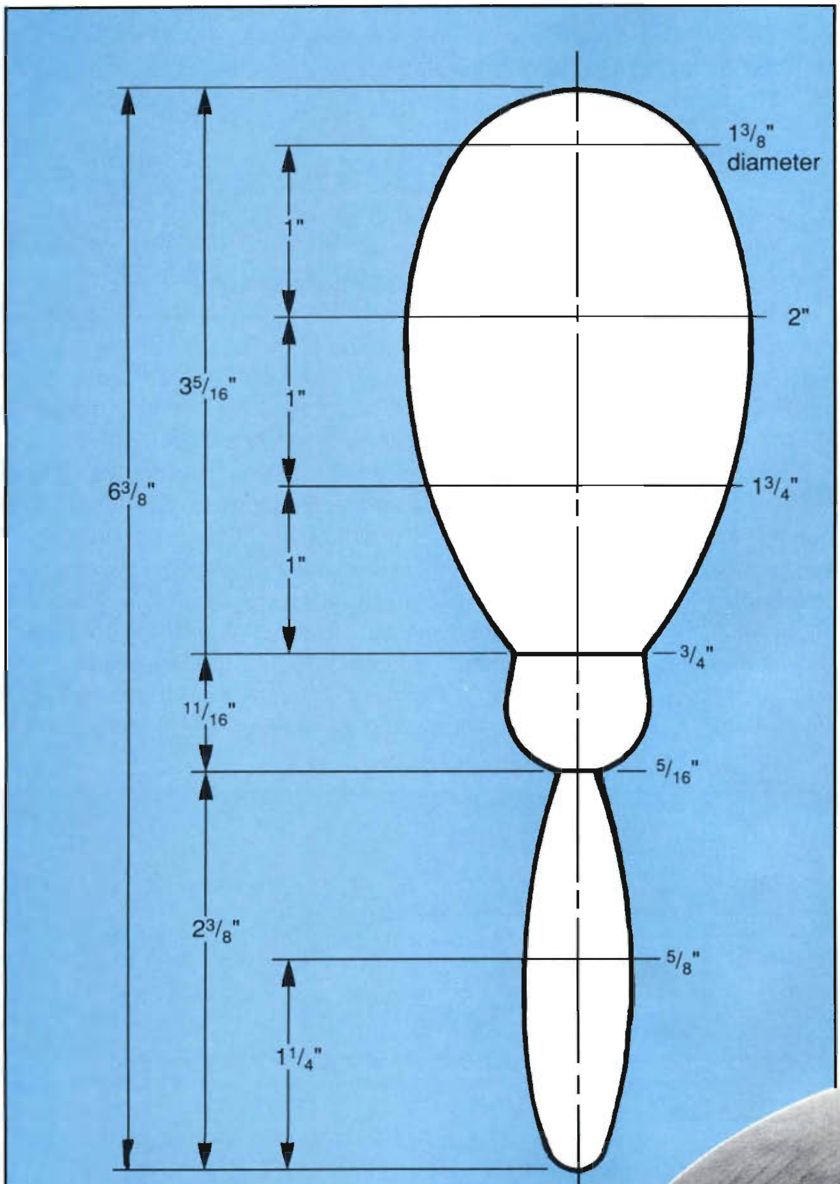
Although the flat forms may be used in the same manner as the tiny American thumb planes, popular with model makers, their advantage lies in their larger width combined with their small size. The majority of metal chariot planes made toward the end of the last century were intended primarily for piano casemakers, but the existence of chariot planes with curved soles suggests other uses for other trades. Like patternmaker's planes, which are provided with sets of differently radiused soles, curved sole chariot planes are of inestimable use in non–rectilinear, shaped work. Their sophisticated design makes them capable of finer work than the small brass violinmaker's planes, which are almost the only shaped planes still available.

Operating Tips

All these planes are capable of very fine work—if in good shape. This means the irons must be razor sharp and set truly in well–maintained soles. They are, after all, mostly finishing tools, despite many a carpenter's predilection for using a battered block plane as a crude chamfering plane on rough stock. Be aware that their small size often makes pulling the plane toward you more convenient and effective than pushing it away from you. Slicing, shearing cuts often produce better results than moving the plane in a straight line. To achieve the very smoothest surface on endgrain—such as at the ends of dovetails—dampen the wood slightly before planing by rubbing a dampened (not wet) rag or sponge across it. This raises the grain slightly and keeps the fibers together so you can take a continuous shaving. You'll be surprised at the superior finish achievable by a sharp block plane. Sanding, which fills the pores and produces unsightly results when stained or oiled, is unnecessary. Perhaps the greatest difficulty in tuning these planes is the correct setting and sideways adjustment of the irons. Depth adjustment is sometimes facilitated by patented devices, but more often than not is a matter of gently tapping the toe, iron or heel. Such adjustment is one reason why the wooden–bodied planes are easier to work with. Another is that wooden soles are more easily trued—by judicious jointing. PW

An Old Fashioned

Sock Darner

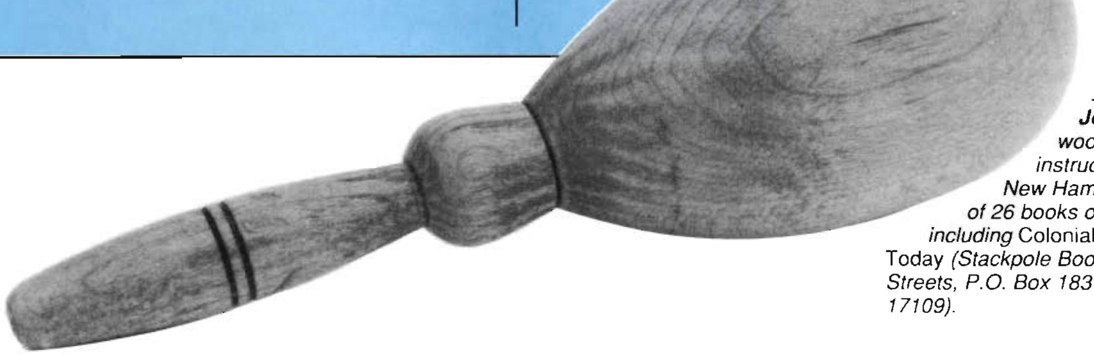


by John A. Nelson

This sock darner is a very simple lathe project. Although they're not used as often these days as they once were, this project makes a nice gift for those who still mend their socks. It's also an excellent display piece for someone who collects antiques. I have a friend whose wife collects gold thimbles; a sock darner would look great with her collection.

Start with a block of wood that is about $2\frac{1}{4}$" square and approximately 8" long. Find the exact center of each end, and use a nail set to prick-punch the ends. Mount the block between centers on the lathe, and turn the entire length to a 2" diameter. Mark off the locations of the various diameters shown in the illustration and turn it to shape. You do not have to be exact; sock darners come in all shapes and sizes. I did a little detailing on the handle by holding a taut wire against the spinning wood and allowing the friction to burn in a couple of stripes.

Sand all over and apply a light coat of satin varnish. Now, let's get started on that pile of old, holey socks. PW



***John A. Nelson** is a woodworker and drafting instructor from Peterborough, New Hampshire, and the author of 26 books on various subjects, including* Colonial Classics You Can Build Today *(Stackpole Books, Cameron and Keller Streets, P.O. Box 1831, Harrisburg, PA 17109).*

A Popular Woodworking Project

Making A Chamfer Plane

by David M. Camp

I'm into woodworking for the fun and challenge of it. So when I was working on this chamfer plane and a friend asked why I was bothering when I could just go out and buy one, I said "Where's the romance in that?"

Sure, I could buy a chamfer plane, or I could cut chamfers with any of a number of tools I've already got (block plane, router or spokeshave to name just a few). But I make things because I enjoy making them, and there's something special about using a tool you've made yourself...a real feeling of pride.

I built this stop chamfer plane from plans submitted by John Sainsbury, a woodworking instructor and the author of *Router Workshop* (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810). John provided me with much of the background in this article, for which I am grateful. For even more information about this plane and similar tools used by our woodworking predecessors to cut chamfers, see "Tried and True: Chamfering Devices" in *PW* #45 (October 1988).

Chamfering is the removal of the corner of a board, usually at 45°. A stop chamfer is one which stops some distance from the end of a board. A stop chamfer plane, however, gets its name from its adjustable stop, which determines the depth of cut and thus the width of the chamfer. You can cut most of a stop chamfer with a stop chamfer plane, but to create the stopped end of the cut, you'll need to use a chisel or a drawknife.

This version of a chamfer plane has a body with a V–shaped sole. The stop is in the form of a wedge–shaped box that can be moved up and down within the plane body. You secure it in position by tightening a screw in the side; the amount the box projects into the V dictates the depth of the chamfer. The iron is held in place with the traditional wooden wedge.

Illustrations by Robert Chapla

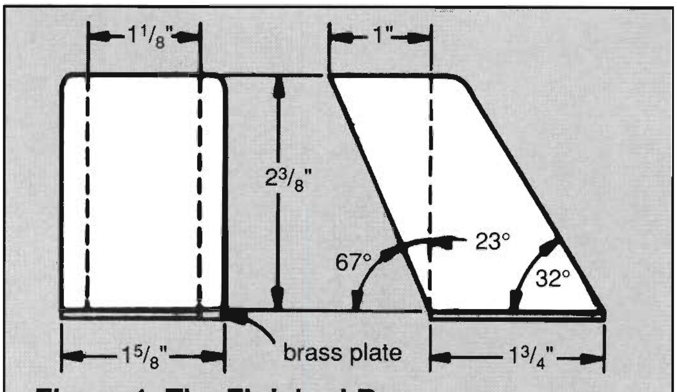


Figure 1. The Finished Box

These tools were typically made of beech, but any hard, stable wood will do. I made mine out of hard rock maple. According to Sainsbury, the best blank for the body of the plane would be a solid chunk that's 2¼" X 2¾" in cross–section, with the annular rings running parallel to the sole. I had to mill stock to 1⅛" thickness and glue two pieces face to face to get the 2¼" width. I now realize I should have planed my material to 1⅜" and stacked the two pieces to get the 2¾" thickness; this would have the annular rings properly oriented. However, I'm not sure that it's really going to make that much difference.

***David M. Camp** is the Editor of* Popular Woodworking.

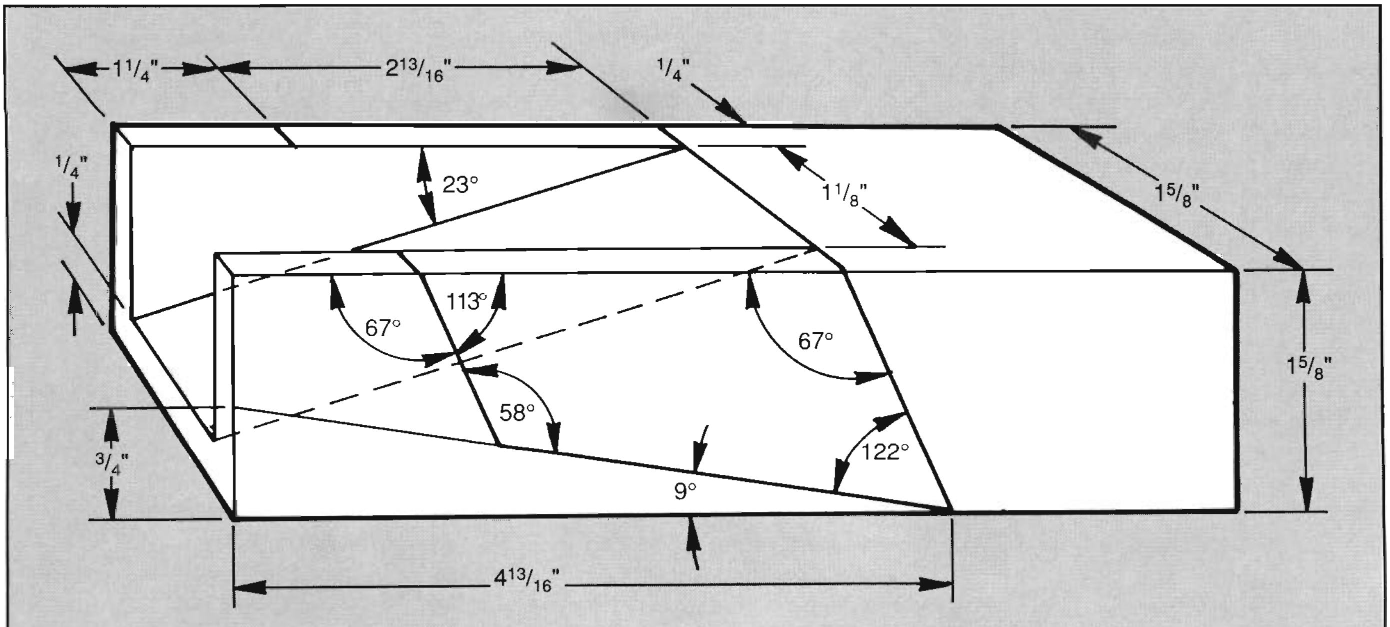
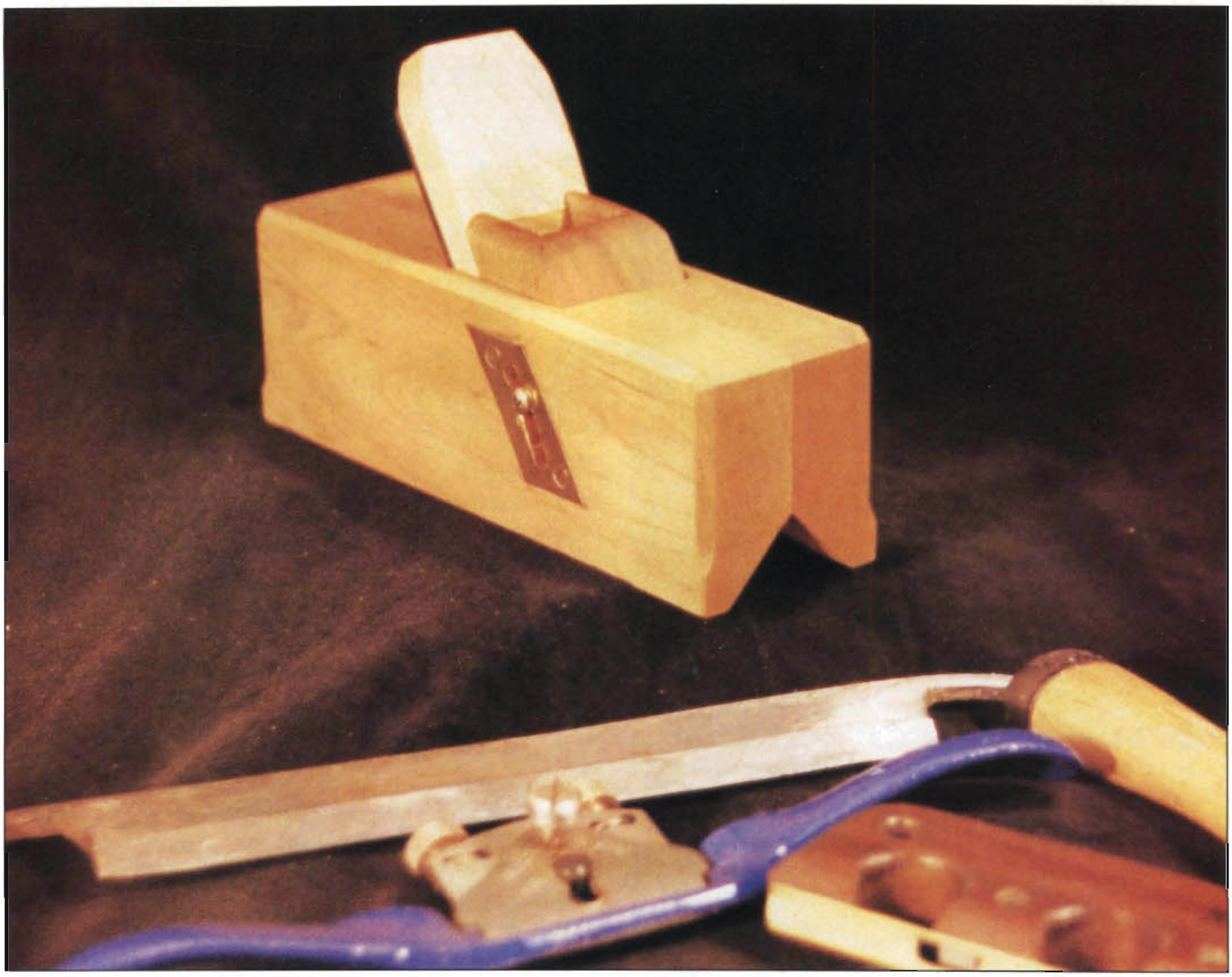


Figure 2. Laying Out the Box



author

Lots of tools can be used for cutting chamfers; making your own chamfer plane gives you a sense of what it must have been like back when the only tools you had were the tools you made.

Start with the Box

Make the box (Figure 1) first. Start by milling some 2" stock down to 1$^{5}/_{8}$" X 1$^{5}/_{8}$"; allow plenty of extra length. Trim one end square and mark the layout lines as shown in Figure 2. Along one edge, mark 1$^{1}/_{4}$" and 2$^{13}/_{16}$" from the trimmed end. Carry these lines across the top of the block using a try square and down the side of the block using a sliding T–bevel set at 113°. Measure up from the bottom along the trimmed end, and strike a mark at $^{1}/_{4}$" and $^{3}/_{4}$"; connect each of these two points to the mark indicating the bottom of the box as shown in Figure 2. Set a marking gauge to $^{1}/_{4}$", and scribe two lines apiece on the top and the trimmed end.

Now use a chisel to remove the waste as shown in the photo above. When that's done, bandsaw the box to its finished shape and sand it smooth.

Making the Body

Next mark the blank for the body of the plane as shown in Figure 3. To remove most of the waste from the throat of the plane, I used a $^{1}/_{2}$" Forstner bit in the drill press. I set up the angle drilling jig discussed in the last issue ("Here's an Angle," *PW* #57, pp. 72) at 32°, and clamped the block to it as shown in the photo on the following page. You have to take time to carefully position the block under the bit before each pass to make sure the bit is inside

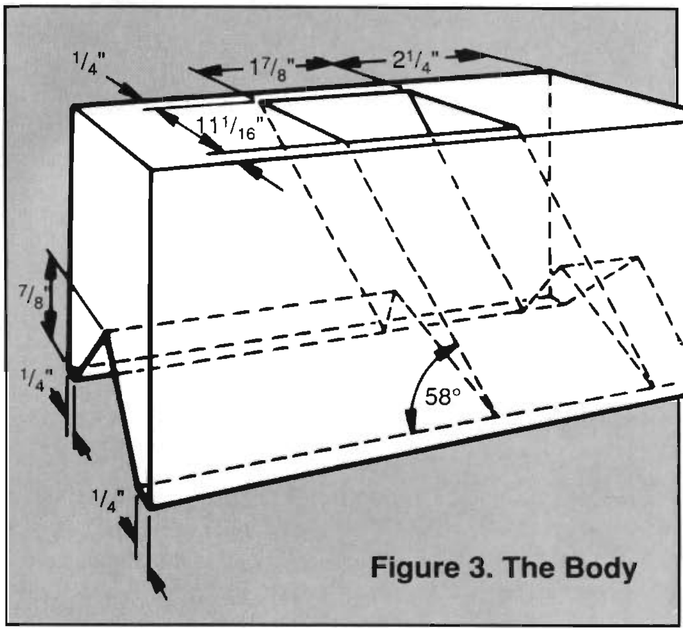
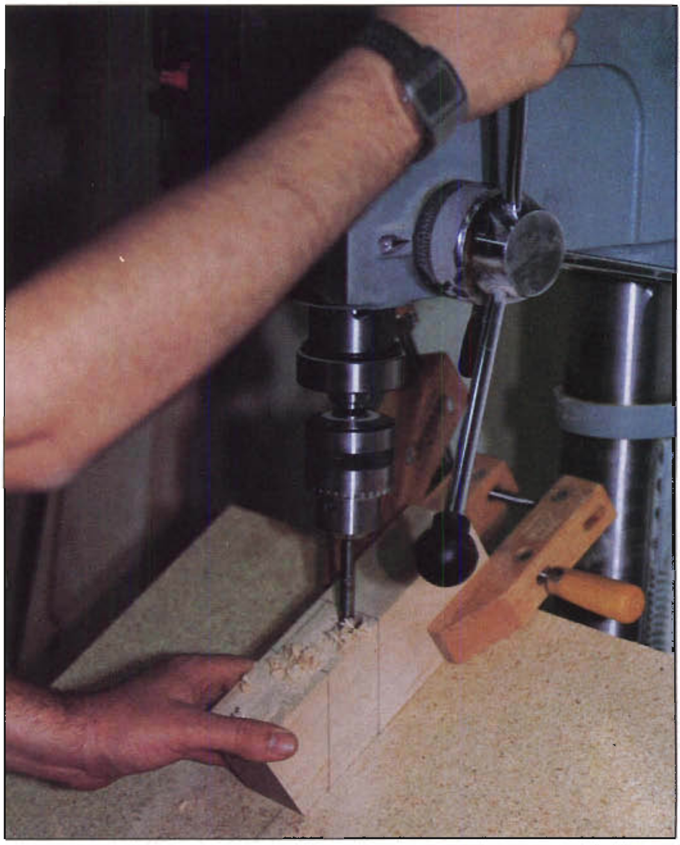


Figure 3. The Body



Clamp the body to the tilting table jig and drill out the waste with a Forstner bit.

Pare the opening square, smooth and flat with a chisel.

photos by Phil Fischer

illustrations by Robert Chapla

the lines. Chances are, the throw of your drill press won't be long enough to allow you to bore all the way through the block from one side; you'll have to flip it over and drill from the other side as well. Then it's just a matter of squaring up the corners and paring to the line with a sharp chisel. You want to make those sloping surfaces as close to flat as you can and perfectly parallel to each other.

Shaping the Wedge

To make the wedge, first plane your stock down to 7/16" in thickness, and rip to 1 5/8" wide. Set your sliding T-bevel to 9° and mark this taper on the edge of the wedge stock as shown in Figure 4. Bandsaw the taper, then mark the boundaries of the "ramp." Bandsaw the waste from that area; then chisel the sloping portion and finish shaping the wedge.

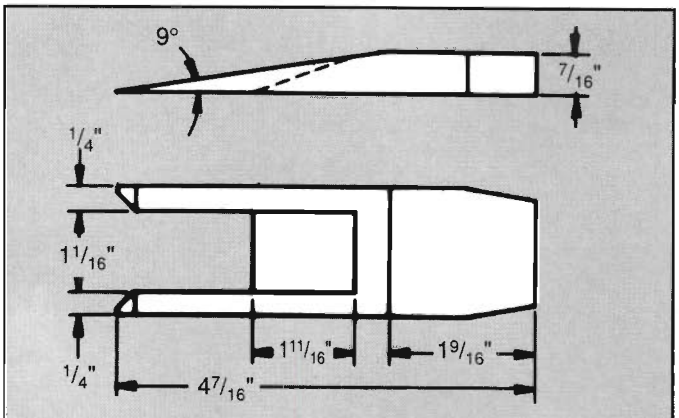


Figure 4. The Wedge

Mate the wedge and the box together and check their fit within the throat of the plane. Make any necessary adjustments, either by sanding the tapered surface of the wedge or—most likely—trimming inside the throat. You'll have it right when the wedge presses evenly against the back of the box and both pieces press evenly against the sloping surfaces in the throat.

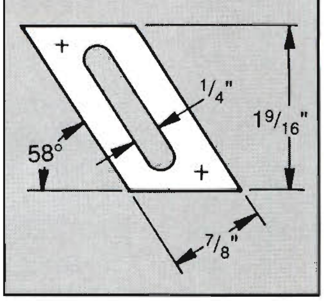
The Metalwork

Now it's time to fabricate the brass trimmings. You can get small pieces of sheet brass at a hardware store or hobby shop; you'll need two pieces approximately 2" X 2". Use tin snips to cut one slightly larger than 1 5/8" X 1 5/8" for the bottom of the box (you'll file it flush after it's attached). The other piece will be the escutcheon behind the set screw on the side of the plane. Cut it to shape using the full-size pattern in Figure 5.

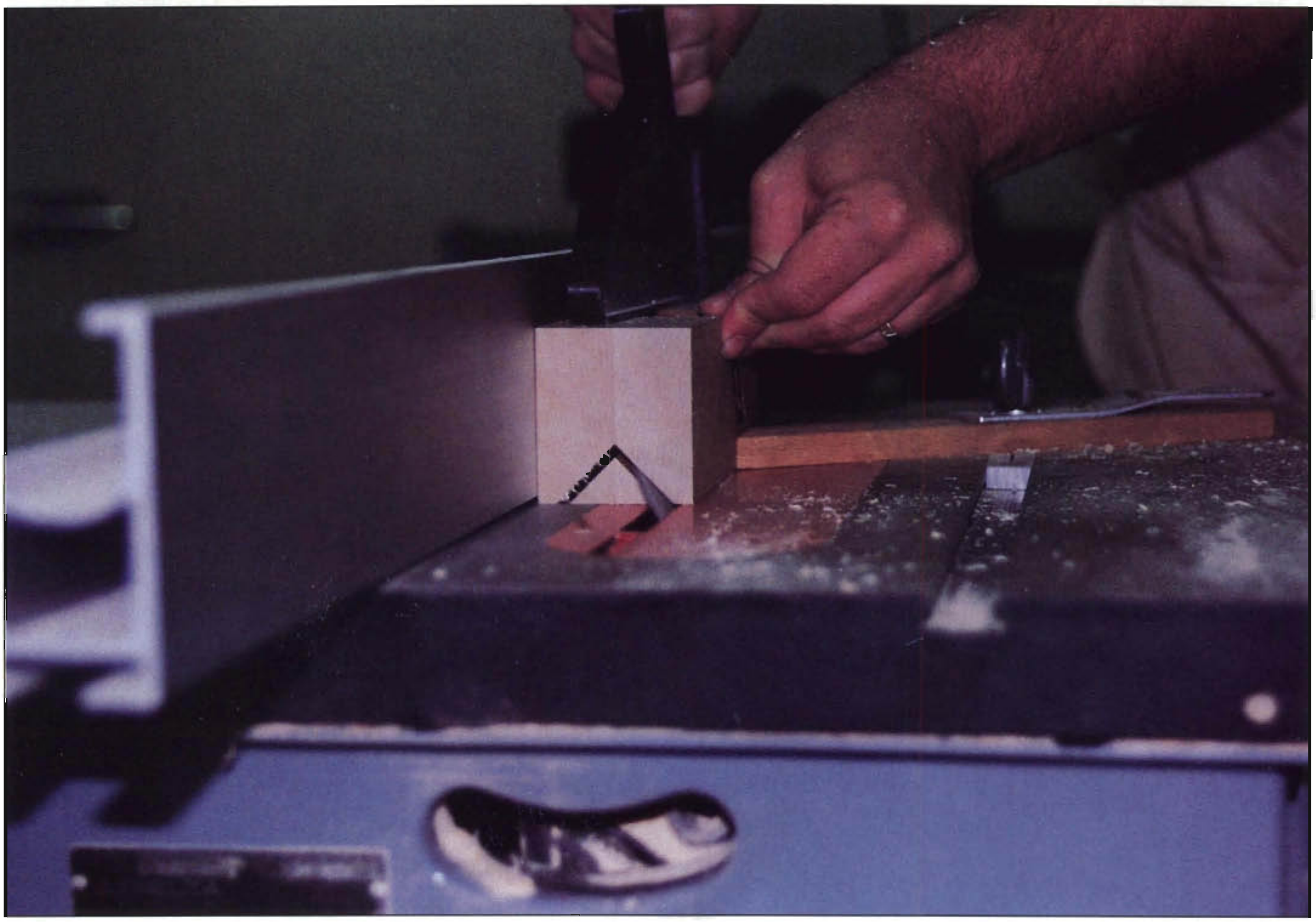
Clamp these fittings to the drill press table with a sheet of scrap steel underneath so you can drill the holes without having them "dimple" out the back. Countersink the holes just enough so the #4 X 1/4" brass flat head wood screws will set flush. Use a 1/4" twist drill to drill the ends of the slot in the escutcheon and cut out the area in between with a jeweler's saw or on a stationary scroll saw as I did. Then file the edges smooth.

Position the escutcheon on the side of the plane and carefully trace around it. Now cut out the slot for the set screw by drilling out the waste and trimming with a chisel. Be careful not to break out the wood inside the plane. Finally, mortise a slight recess in the

Figure 5. The Escutceon



Drill holes to locate the ends of the slot, saw out the waste with a scroll saw or a jeweler's saw then file it smooth.



Use a featherboard and a push stick to maintain pressure as you saw out the "V." Stand to the side because the scrap will shoot out when you complete the cut.

side of the plane so the escutcheon fits flush.

Position the box within the throat so that its bearing surface is about $1^3/_8$" from the sole of the plane. Mark the set screw location on the box centered in the upper end of the slot. Drill a hole to accept a #10 X 1" brass round head screw.

The next step is to cut the V in the sole of the plane. I did this on the table saw using a sharp combination blade set at 45°. Position the fence 2" away from where the outside of the blade enters the table. Raise the blade part way and make a test cut; then adjust the depth until the upper corner of the blade cuts in the exact center of the block. When you turn the block around to cut the other half of the "V," *make sure there's no one behind you and that you stand to the side* because the scrap will shoot across the room when you finish the cut.

Final detailing of your stop chamfer plane includes smoothing the V with a rabbet plane or a sanding block and rounding or chamfering the edges of the body to make it comfortable to grip. I shaped the edges of mine with a chamfering bit mounted in my router table, just for the irony of it.

Trace around the escutcheon;
then chisel a shallow mortise so it will set flush.

Finishing It and Using It

Disassemble everything and soak the wooden parts with several coats of linseed oil. Then install the brass pieces, hone the iron and try it out. I used a plane iron (#BL161) made by Hock Handmade Knives (16650 Mitchell Creek Drive, Fort Bragg, CA 95437, phone 707-964-2782), but you may come across an old plane iron somewhere that you can use. Some may need to be ground to the narrower width required for this tool.

To use the plane, position the box at the depth you want and secure the set screw. Insert the iron so that it appears as just a hairline below the box, and tap in the wedge to hold it in place. Hold the plane so that one side of the V sole rests on the wood, and make a series of cuts until the other side of the V contacts the wood, indicating the chamfer is at the required depth PW

Project for the Shop

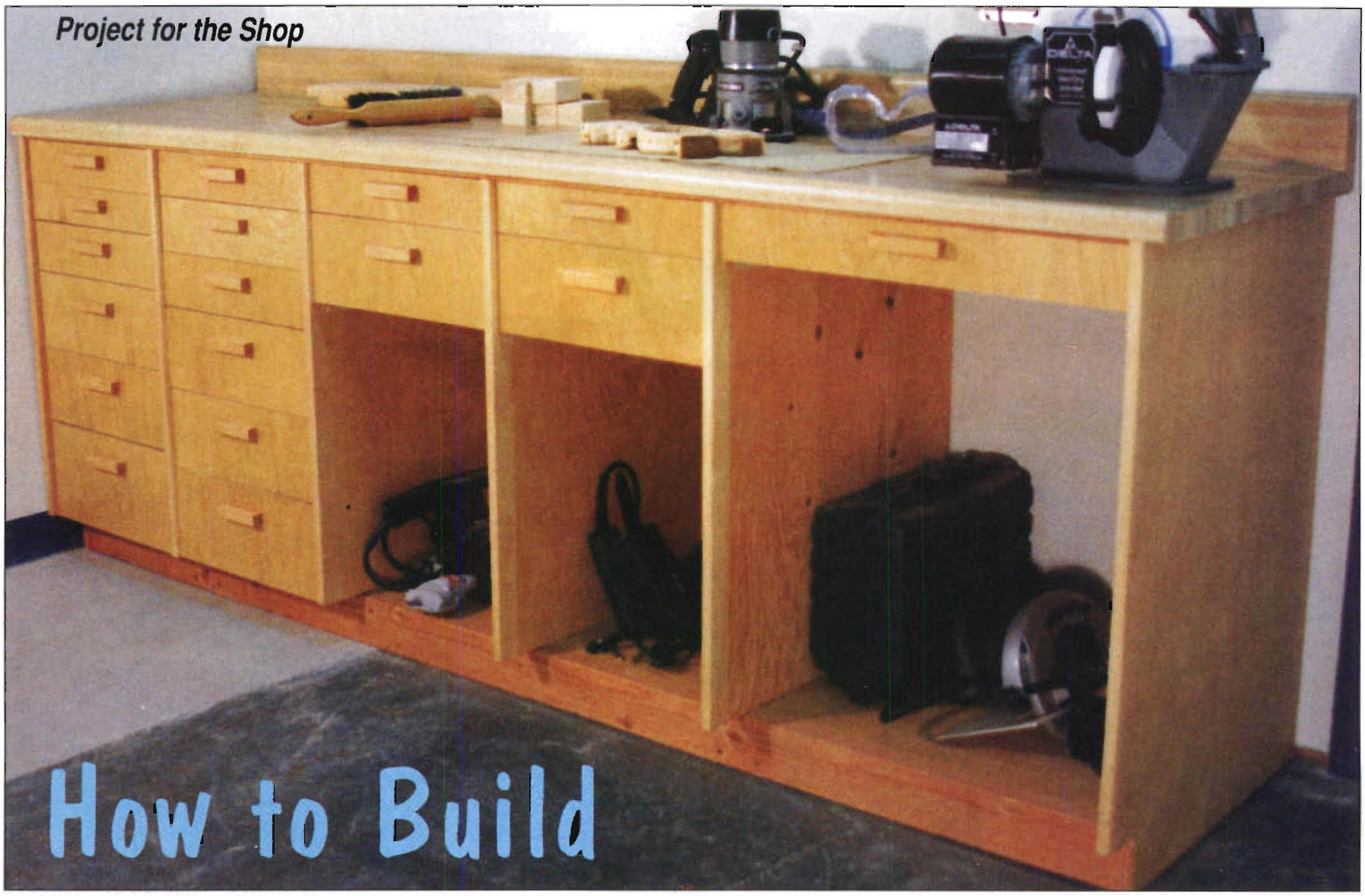


photo by Phil Fischer

How to Build Shop Cabinets

by Link Lincoln

How often have you left your stuff in a jumble, promising that "one of these days" you'll organize and store everything efficiently? The shop cabinets here will make tools and supplies convenient and work more enjoyable without costing an arm and a leg. The cabinet and bench are built around strong, standardized drawers which slide easily, even when heavily loaded. A drawer may be exchanged for any other of the same height, and dimensions are planned to make the best use of 4' X 8' panels. They're easy to make with a table or radial arm saw and a set of dado blades. I used fir plywood with one smooth side, but particle board will make a very solid cabinet. Its simple design and uncluttered appearance also make the project a candidate for quality hardwood plywood.

***Link Lincoln** is a retired vocational teacher in Folsom, California who's been working wood for over forty years.*

All drawers are approximately 16" wide and 24" deep; heights depend on what you want to keep in them. Drawers less than 2" high inside are usually too small except for special tools, like a single custom–fitted layer of wood chisels. Drawers over 8" become crammed, making it hard to find anything. If you want to store items too large for drawers, like portable power tools, include open spaces with adjustable shelves. Figure 1 shows a three–column cabinet, and the sidebar on page 33 shows

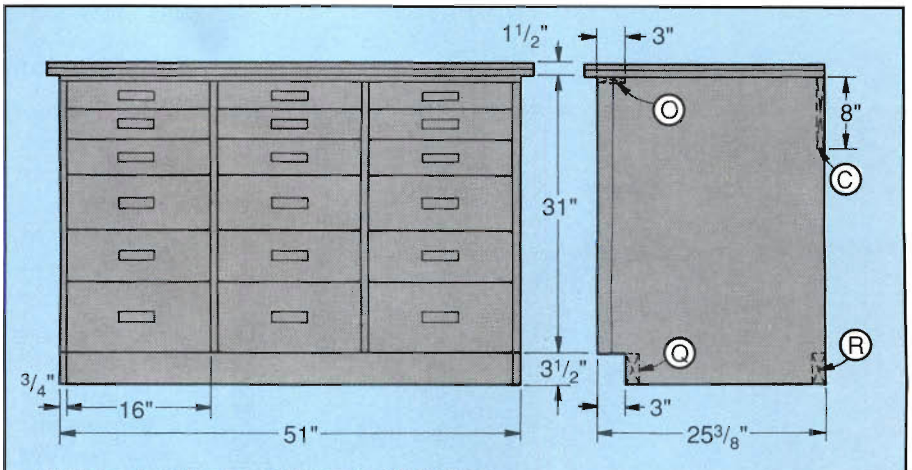


Figure 1. Three–Column Cabinet

Three–Column Shop Cabinet Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
4	A	3/4"	23 3/4"	34 1/2"	ends & dividers
2	B	3/4"	27"	54"	tops
1	C	3/4"	8"	49 1/2"	back support
3	D	3/4"	2 7/8"	15 7/8"	drawer fronts
3	E	3/4"	3 1/8"	15 7/8"	drawer fronts
3	F	3/4"	3 7/8"	15 7/8"	drawer fronts
6	G	3/4"	5 7/8"	15 7/8"	drawer fronts
3	H	3/4"	7 7/8"	15 7/8"	drawer fronts
3	I	3/4"	2 3/8"	14 3/8"	drawer backs
3	J	3/4"	2 5/8"	14 3/8"	drawer backs
3	K	3/4"	3 3/8"	14 3/8"	drawer backs
6	L	3/4"	5 3/8"	14 3/8"	drawer backs
3	M	3/4"	7 3/8"	14 3/8"	drawer backs
18	N	1/2"	15 7/8"	23 7/8"	drawer bottoms
1	O	3/4"	3"	49 1/2"	front support
4	P	3/4"	1 5/8"	31"	face trim strips
1	Q	1 1/2"	3 1/2"	49 1/2"	kick plate
1	R	1 1/2"	3 1/2"	49 1/2"	base support
2	S	1 1/2"	3 1/2"	30"*	cross braces
72	T	7/16"	5/8"	22"	drawer runners
18	U	3/4"	7/8"	4"	handles
6	V	1/4"	2 5/8"	23 5/8"	drawer sides
6	W	1/4"	2 7/8"	23 5/8"	drawer sides
6	X	1/4"	3 5/8"	23 5/8"	drawer sides
12	Y	1/4"	5 5/8"	23 5/8"	drawer sides
6	Z	1/4"	7 5/8"	23 5/8"	drawer sides

*trim to fit

a five–column cabinet. Cutting lists are given for both, and their dimensions include a 24" depth, 36" bench height, and a 3 1/2" kick space. You may want to alter the bench height for your own comfort or to suit particular tools or tasks. The top is made from glued up stock or two layers of 3/4" plywood. You can use particle board for one or both pieces if you surface the top with replaceable tempered hardboard.

A cabinet assembly consists of columns of drawers, each 16" wide, separated by vertical panels of 3/4" plywood. With its three columns and four panels, the smaller cabinet measures 51" long. The larger cabinet includes six verticals, four 16" columns, and one 24" wide column to provide space for larger tools. Many adaptations of the basic plan are possible; the instructions are meant to help you design and build a cabinet to meet your needs.

Planning and Cutting

Begin by determining your approximate overall dimensions. Check where the cabinet will go, the arrangement of tools and the work space. Make sure that you'll have clear access to all drawers, and pay attention to how close the cabinet comes to a doorway—you don't want to bang the bench corner every time you walk by. Make the length of the cabinet a multiple of the 16" drawer width to keep the panel cutting layouts as efficient as possible. Any departure from this standard should be carefully planned to minimize waste.

Make a sketch—it needn't be exactly to scale, but keeping the parts proportional helps you visualize better and avoid errors. Consider what the drawers will hold, their heights and arrangement, and whether you want to include spaces and shelves. Make the sketch large enough to mark lengths and widths clearly, and label the pieces. Then draw a cutting layout for each plywood panel on graph paper, or photocopy the form on page 63 of the May 1990 issue of *Popular Woodworking* (#54). Check all dimensions again. A few minutes here can save hours later.

The dimensions given in the Cutting Lists are planned to fit 4' X 8' panels. Four cabinet ends and dividers (A) take the better part of one 3/4" panel, and one top piece (B) plus the upper back support (C) require another. The panel remainders can be cut into enough 15 7/8" and 14 3/8" wide columns to cover the drawer fronts (D–H) and backs (I–M). If you want the grain to show, lay out the fronts in the same sequence they'll take in the drawer columns. The 18 drawer bottoms (N) will need 1 1/2 panels of 1/2" plywood (don't use particle board for the bottoms). Make full panel length (or width) cuts first. Then set the table saw fence and cut off the pieces, according to your layout. Label each piece and stack them so you know what's where.

Parts not made from plywood—the upper front support (O), face trim (P), kick

illustrations by Bob Chapla

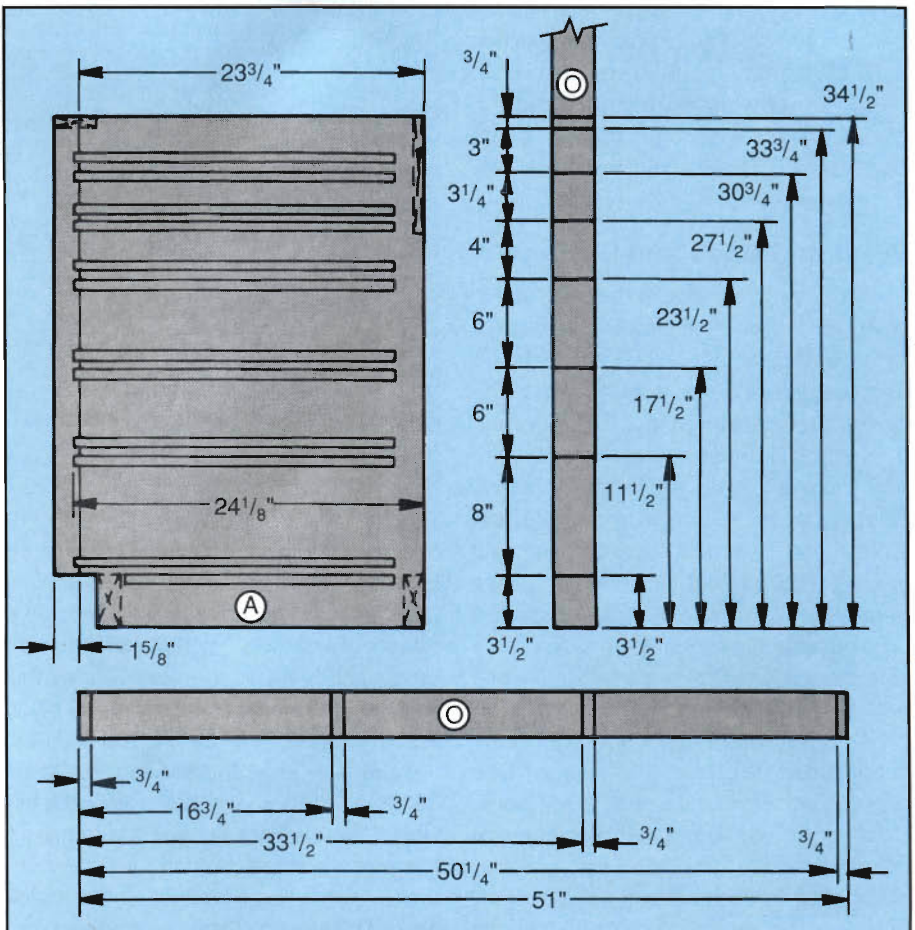


Figure 2. Cabinet Marking Beam and Drawer Runner Layout

plate (Q), base support (R), cross braces (S), drawer runners (T), and handles (U)—can be cut now or when you're ready for them. Take care to cut the upper front support (O) carefully—it must be square and accurately dimensioned because you'll use it to mark the positions of all the other parts. Since its front edge will show, make it from the same material you use for the face trim strips (I used fir for both). Set this "cabinet marking beam" on your work surface and mark one face "horizontal." With a tape measure mark the locations of the drawer columns and dividers as shown in Figure 2. Then turn the marking beam over and label this side "vertical." Mark the vertical spacing, beginning with the $3^{1}/_{2}$" kick space and continuing with the full height of each drawer in order. Use a try square to make all the marks the full width of the beam. Check the beam well and use it to mark the cabinet base, to position all vertical pieces and runners, and to check cut pieces. When the cabinet is assembled, it'll fit right in, already marked with the correct spacing of the divider panels.

At this point you must decide whether to build all the drawers first, or the cabinet frame. If you don't have much work space, build the frame first; then you'll have the bench top to work on while making the drawers. If you wish to make the drawers now, just skip ahead and come back for the frame later.

Preparing Ends and Dividers

If you're planning to let the grain show, select the two vertical panels with the best faces for the cabinet ends. Face trim their front edges, and the front edges of the divider pieces, with strips $1^{5}/_{8}$" wide and the same thickness as the dividers. If you're not planning to paint the finished cabinet, select a wood for the face trim that will either match or contrast appropriately with the rest of the cabinet. You can use splines or biscuits and glue, or just glue and a few brads to attach them. Align them carefully so they're flush with the panels and won't require much sanding. Scrape off any excess glue and sand lightly (watch out—the veneer on some plywood is very thin). Use a router, plane or table saw to lightly bevel, chamfer, or fully round the front edges of the trim strips.

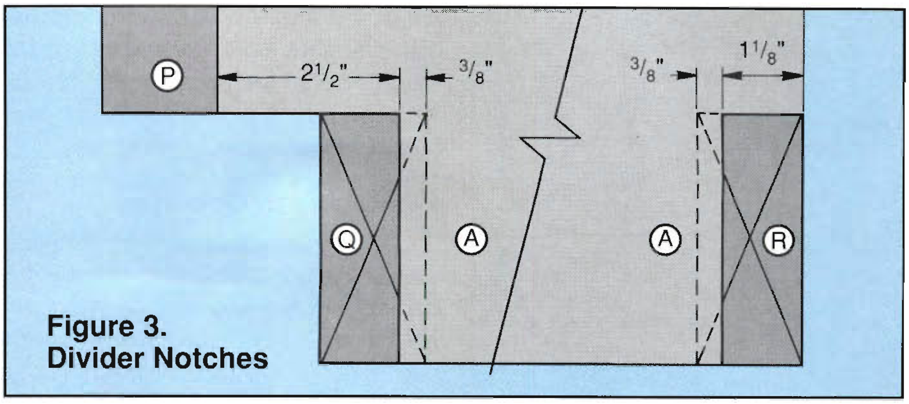


Figure 3. Divider Notches

illustrations by Bob Chapla

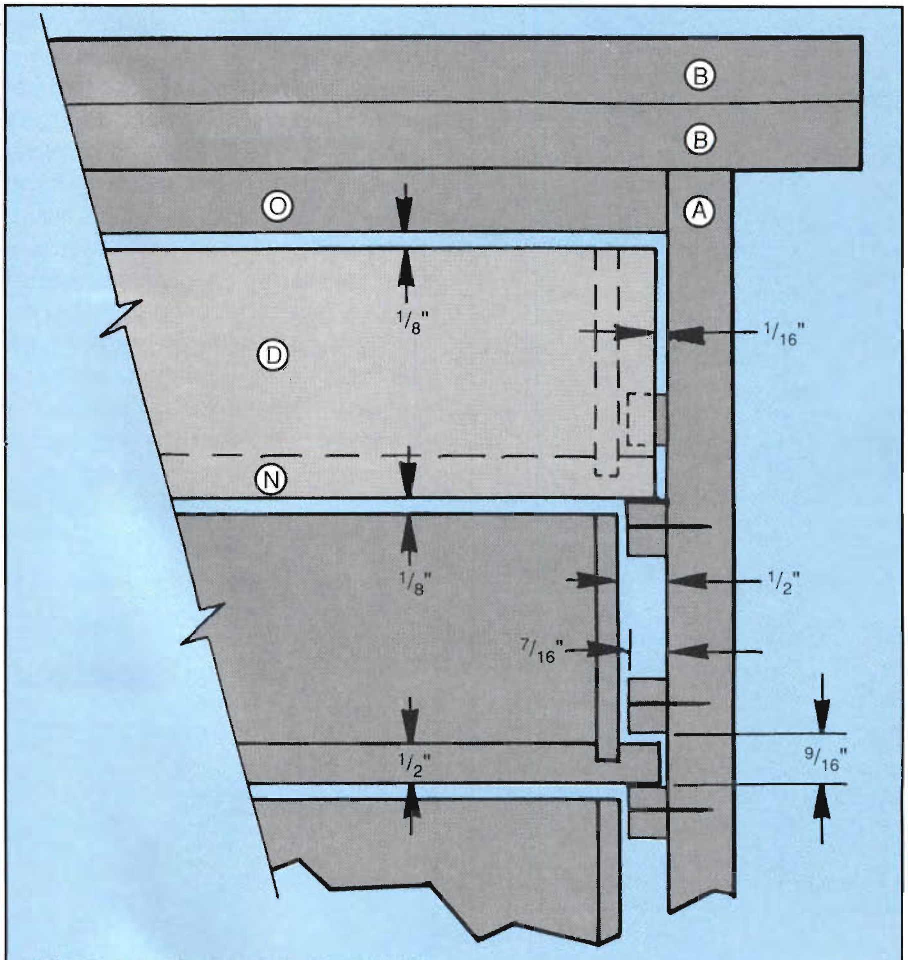


Figure 4. Drawer Clearances

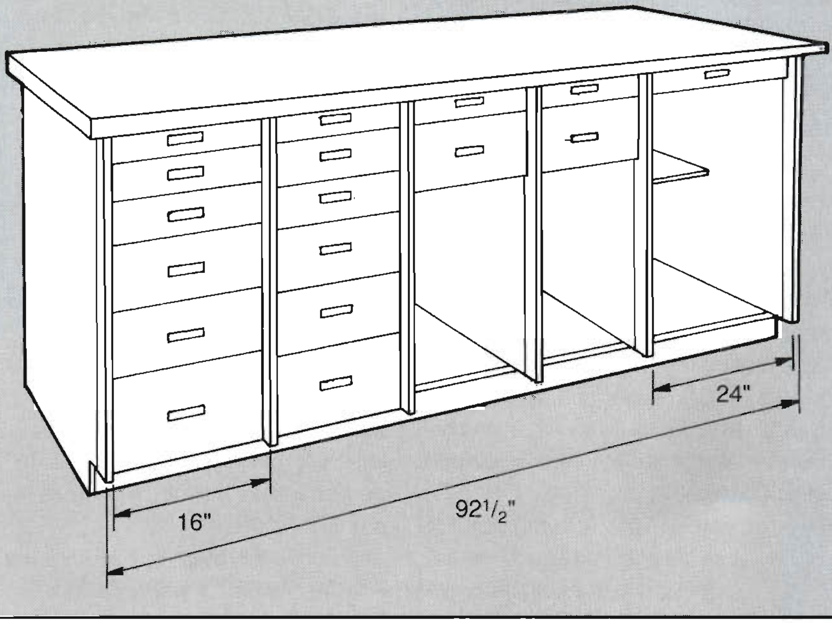
Lay a trimmed end panel outside down, and using the "vertical" side of the marking beam, transfer all marks to the front and rear edges (Figure 2). Then draw lines locating the bottom of each drawer. Now mark $24^{1}/_{8}$" in from the rear edge on the bottom drawer line. This is where the runners start. Mark all the drawer lines this way—on the inside of the other end piece and on both sides of the vertical dividers.

Mark the kick spaces and cut them out—I used the band saw with a fence. Notice that the kick spaces are larger on the inside dividers than on the ends (Figure 3). Do the same for the notches where the back and upper front supports will run through—but only on the inside dividers.

You're ready for the runners (T). Each drawer requires four, and you'll probably need a few replacements. The $^{7}/_{16}$" thickness is the only important dimension—the width can vary from $^{5}/_{8}$" to $^{3}/_{4}$", and the 22" length can be a bit less. Runners must support the full weight of the drawers and their contents, so they should be a fairly hard, straight-grained wood. One side should be smooth and the front end square. In addition to the runners, cut a special piece $^{5}/_{8}$" X $^{9}/_{16}$" X 22" to use as a spacer. Since it will position all the runners, make it straight and true. As Figure 4 shows, the drawers will be $^{1}/_{8}$" less than the inside

Building A Five-Column Shop Cabinet

Since the basic unit of this design is the 16" wide drawer column, you can plan a cabinet to fit your needs. If you want a larger cabinet that includes open spaces for storing portable power tools and other items larger than hand tools, plan for 1/2" plywood floor panels and perhaps a shelf or two. Floor panels should fit between the 2 X 4 base supports, top surface flush with the tops of the supports. Attach drawer runners to the dividers 1/2" below the top of the base supports for the floor panels to sit on. As the photo on page 30 shows, I added a plastic–laminated countertop with backsplash to this cabinet.



Five–Column Shop Cabinet Cutting List				
Qty	Finished Size T	W	L	Piece
6	3/4"	23 3/4"	34 1/2"	ends & dividers
6	3/4"	1 5/8"	31"	face trim strips
1	1 1/2"	3 1/2"	91"	kick plate
1	1 1/2"	3 1/2"	91"	base support
1	3/4"	3"	91"	front support
1	3/4"	8"	91"	back support
1	1 1/2"	3 1/2"	31"*	cross brace
1–4	1 1/2"	3 1/2"	26"*	cross braces
2	3/4"	20 7/8"	15 7/8"	cabinet doors
1	3/4"	26 7/8"	23 7/8"	cabinet door
1	1/2"	24"	19 3/8"	cabinet bottom
2	1/2"	16"	19 3/8"	cabinet bottoms
74†	7/16"	5/8"	22"	drawer runners
4	3/4"	3 1/8"	15 7/8"	drawer fronts
1	3/4"	2 7/8"	15 7/8"	drawer front
3	3/4"	3 7/8"	15 7/8"	drawer fronts
6	3/4"	5 7/8"	15 7/8"	drawer fronts
1	3/4"	6 7/8"	15 7/8"	drawer front
1	3/4"	7 7/8"	15 7/8"	drawer front
1	3/4"	3 1/8"	23 7/8"	drawer front
16	1/2"	15 7/8"	23 7/8"	drawer bottoms
1	1/2"	23 7/8"	23 7/8"	drawer bottom
10	1/4"	2 7/8"	23 5/8"	drawer sides
2	1/4"	2 5/8"	23 5/8"	drawer sides
6	1/4"	3 5/8"	23 5/8"	drawer sides
12	1/4"	5 5/8"	23 5/8"	drawer sides
2	1/4"	6 5/8"	23 5/8"	drawer sides
2	1/4"	7 5/8"	23 5/8"	drawer sides
4	3/4"	2 5/8"	14 3/8"	drawer backs
1	3/4"	2 3/8"	14 3/8"	drawer back
3	3/4"	3 3/8"	14 3/8"	drawer backs
6	3/4"	5 3/8"	14 3/8"	drawer backs
1	3/4"	6 3/8"	14 3/8"	drawer back
1	3/4"	7 3/8"	14 3/8"	drawer back
1	3/4"	2 5/8"	22 3/8"	drawer back
2	3/4"	27"	92 1/2"	tops

spacer strip 5/8" X 9/16" X 22"   *trim to fit
†six serve as cabinet bottom supports

width of the cabinet columns, so there'll be 1/16" play on each side. The 9/16" runner spacing gives 1/16" clearance for the 1/2" thick drawer bottoms. This will support the drawers extended to about three–fourths their length and permit smooth sliding.

The spacer strip will efficiently position runner pairs as you nail and glue them in place. First glue and nail a runner so its top edge runs along a drawer line. Then hold the space snugly against it, push another, pre–glued runner against it, and nail it in. If you're having trouble positioning accurately, temporarily tack the spacer in first while you secure the runners. Exact alignment is crucial to the cabinet's appearance. Use 7/8" or 1" nails—a nail shooter really makes short work of this step. Then remove the spacer and repeat the procedure for the rest of the runner pairs. Note that the bottom–most runners must be cut less than 22" long so as not to block the notches in the divider panels for the base supports.

Assembling Frame and Top

Cut 3/4" wide X 3/8" deep dadoes across the 2 X 4 kick plate and lower back support to accept the notched dividers, and you're ready to assemble the frame. Begin by nailing and gluing the base and vertical pieces together. Then install the upper back and front (marking beam) supports. If your work is accurate the dividers will be exactly 16" apart, top and bottom, front and rear. If not, fix them before the glue dries. Then turn the frame upside down, measure diagonals and square the base and vertical pieces. Measure carefully and cut two or more cross braces to fit into the base (Figure 5).

Two thicknesses of 3/4" plywood or particle board will provide a solid bench top. One of them can be pieced. Install the full-size piece first with glue and screws. Be generous with the glue and nails when you install the second layer. Cover the exposed edges with metal trim, wood moulding, or a strip of 1/8" tempered hardboard 1 1/2" wide. Secure the hardboard to the top with small brads 6" to 8" apart so that it overlaps the hardboard on the edges. If you don't use glue, you'll be able to replace the top surface easily. If

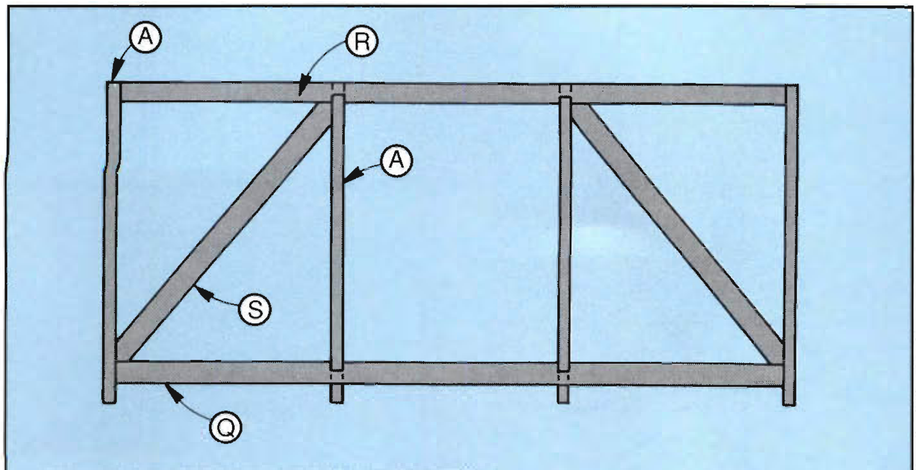


Figure 5. Cabinet Bottom Bracing

illustrations by Bob Chapla

you plan to install the cabinet against a wall permanently, however, don't add the hardboard top until after the cabinet is in place.

Drawer Construction

When cutting rabbets and dadoes, make trial cuts in scrap each time you reset the fence or the blades, and use the drawer parts themselves to check the grooves. They should be just wide enough to accommodate the stock easily. Set the table saw up to cut $^1/_2$" X $^1/_2$" dadoes. Clamp a wooden auxiliary fence to the saw fence and position it directly adjacent to the blade. Use this set–up to rabbet the lower inside edge of all the drawer fronts. Then re–set the blades to cut grooves $^1/_4$" wide and move the fence so there's $^1/_2$" between it and the blade. Use this setting for cutting dadoes in all the drawer fronts where they join the sides (Figure 6). Now lower the blades so they'll cut $^1/_4$" deep. Run the bottoms through, making the cuts on the good side of the plywood parallel to the $23^7/_8$" sides. All drawer cutting is complete. Now's a good time to sand all pieces and break sharp edges. It's also easier if you layout and drill holes now for the knobs or pulls you plan to install later.

Make a trial assembly by sliding the sides into the bottom, then the front and back. Stack the parts in the order you'll need them. Start two or three nails near the front edge of the bottom (not in the dadoes). Set a drawer front upside down so the rabbet is up, run a bead of glue on each face of the rabbet, angle it slightly as shown in the detail to Figure 6, and position the bottom over it. Check the alignment, and drive the nails through the bottom into the front. After the first two nails, straighten the front and drive several more. The angling helps pull the bottom tightly into the front.

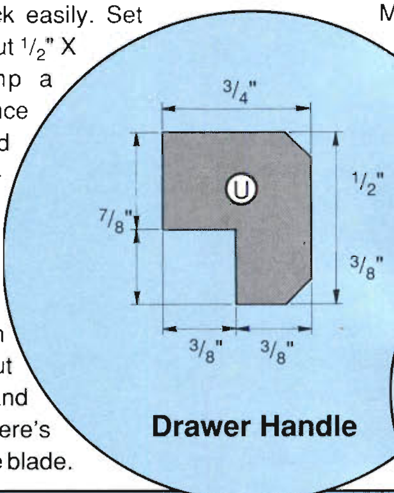
Turn the parts over, run a bead of glue in the dadoes, and insert the sides in the dadoes. Apply glue to three edges of the back, position it, and drive the nails to secure it to the sides. Then turn the drawer upside down and tap the back ends of the sides to square up the fronts and tighten the assembly. When the front is square to the bottom, drive a few more nails through the bottom into the front and back. Proper alignment here is critical to the overall appearance of the cabinet.

When all the drawers have been assembled, remove excess glue with a scraper and finish–sand. Attach purchased knobs or make them from the same material you use for the face trim strips (see the detail in Figure 6).

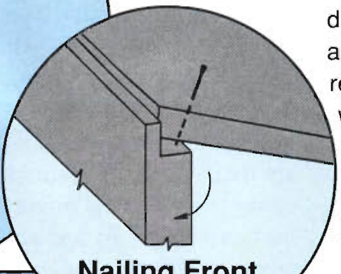
Push a chrome–headed thumb tack into the cabinet between each drawer runner pair. Put another in the side edge of the drawer bottom near the rear. These tacks help guide the drawer and make it slide easier. You should also rub the sides of the drawer bottom and inside the cabinet with an old candle or beeswax. Use plenty and reapply it as the drawers are used in the weeks and months ahead. Once the wax works well into the wood, the drawers will run very smoothly.

Installation

If you want to install the cabinet permanently against a wall, don't nail the hardboard over the bench top until you've taken the following steps. First, push the cabinet close to the wall and trim the base as required. Then drill and countersink a hole at about 30° through the bench top near the back. Align the hole with a wall stud behind the cabinet, and use a long screw to secure the cabinet to it. Then install the hardboard bench top. You can make the cabinet freestanding by adding $^1/_4$" plywood to the back, and movable—just install casters. PW



Drawer Handle



Nailing Front to Bottom

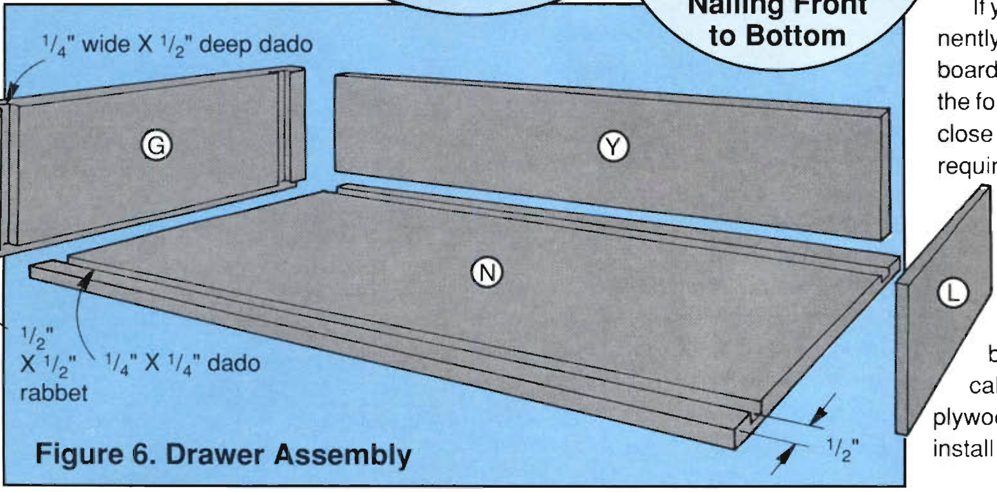
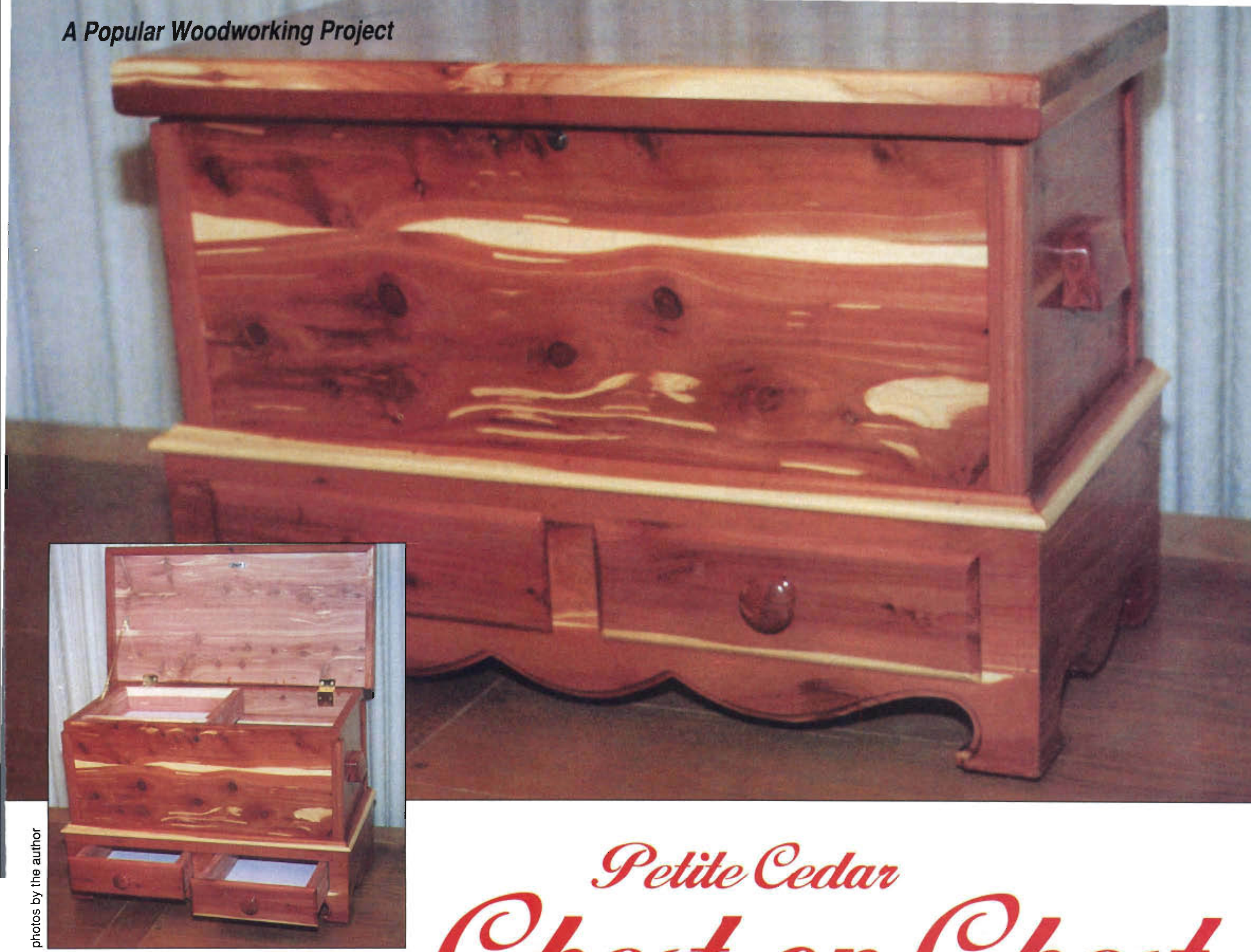

$^1/_4$" wide X $^1/_2$" deep dado
G
Y
N
L
$^1/_2$" X $^1/_2$" rabbet
$^1/_4$" X $^1/_4$" dado
$^1/_2$"

Figure 6. Drawer Assembly



photos by the author

Petite Cedar
Chest on Chest

by Devore O. Burch

Cedar chests are perennial favorites, especially with the ladies. Here's one that uses the chest on chest design popular with furniture makers for years. Mine is small, but you can easily make yours larger by scaling up the drawings and dimensions. I used about 30 board feet of Tennessee aromatic red cedar, a beautiful and unusual wood that works easily and has a fragrance everyone loves. After you build this chest, your shop will smell like aromatic cedar for weeks to come.

Since red cedar is sold only in random widths of 4" to 8" and lengths of 4' to 8', you'll need to glue up panels for the top, bottom, ends, front and back. First lay out all your boards on the floor with the best sides up. Select the choicest ones for the top and front, then for the ends. Use the rest for back and bottom. When you arrange the boards for edge gluing, match white to white and red to red so the glue lines won't be obvious. Red cedar has very pronounced white streaks which add to its beauty, but if white is mated to red, the glue line will be quite evident. Make up the panels with about 1" excess in width and length for trimming later. Once the glue has dried, scrape off any excess and sand the surfaces. Save the cedar dust to make cedar wood filler.

***Devore O. Burch** is a woodworker in Fort Worth, Texas and a frequent contributor to* Popular Woodworking.

Upper Chest

Cut the front (A), back (A) and ends (B) to size, and rabbet the front and back $1/2$" deep X $3/4$" wide to accept the ends. Assemble with finish nails and glue (Figure 1) and check for square. The bottom (C) fits flush with the outside edges of the box, but the lid (D) is $13/16$" wider and $1\,5/8$" longer so that with $3/4$" trim (E) attached to the underside, there will be $1/16$" clearance when the lid closes. Mill some $3/4$" X $3/4$" cedar for this trim, and apply it along the front and end edges of the lid, mitering the corners at the front. Round the upper and lower surfaces of all three edges with a router. The back edge of the lid should be flush with the back of the chest.

While the bottom is still open, hinge the lid to the box and add the lid support and lock. Then attach the bottom with #8 X $1\,1/2$" countersunk wood screws. If you like my handles (F), glue scraps into two 1" thick blocks. Shape them with the full–size pattern you'll find in the PullOut™ Plans, and install with #8 X $1\,1/4$" screws driven from the inside. Remove the lid for now.

Since wide boards aren't available, you'll need to glue up panels.

Rabbet the upper chest front and back to receive the ends.

Lower Chest

The top rail (G), three spacers (H), and the bottom rail (I)—the lower chest's front panel—are assembled with dowels and glue. Cutting List dimensions provide enough excess to miter the ends of the assembled panel and join them to the front edges of the lower chest end pieces (J). The drawer openings measure 10 1/2" X 3". When the front panel is dry, lay out and bandsaw the decorative curves on the ends, back (K), and front panel using the patterns in the PullOut™ Plans. Rout the curved edges using a cove bit. Then rout a 3/4" wide X 1/2" deep rabbet along the back edges of the lower chest ends, stopping 1" from their top edge (Figure 1). Square the corner of the rabbet with a chisel to accept the lower chest back (K).

You're now ready to fit the lower chest ends (J) to the upper chest. Mark and cut miters on their front edges, and attach one of them to the upper chest with finish nails and glue. Cut corresponding miters on the ends of the front panel (rails and spacers) and attach in the same way. Glue and nail the other end in position, and secure the back (K) so it rests in the stopped rabbets. Install the corner blocks (L) with glue and finish nails (Figure 1). The upper chest is now resting on the lower back and the corner supports, as well as glued and nailed to the lower front and ends. Glue the drawer guides (M) to the faces of the drawer supports (N) to make four L–shaped pieces. Notch the corners of two of these assemblies to fit around the corner blocks (Figure 1).

Cedar moulding is not commercially available, so shape your own trim (O) from a clear piece using the cross–sections in the PullOut™ Plans. Miter the corners and secure it to the chest with glue and finish nails. Don't put any on the back. Now make the front and back corner edge mouldings (P and Q) and install them. Shape the front pieces from 1" X 1" stock if you have it, or glue them up from 1/4" thick pieces. Set all nails and mix cedar sanding dust with glue for a wood filler.

Install the tray supports (R) and spacer (S) with finish nails and glue. The spacer permits the tray to slide past a surface–mounted lock—or you can install a fully mortised lock. The chest is now complete, and you're ready to tackle the tray and drawers.

Tray and Drawers

The tray is a simple box with rabbetted corners, made to fit in the chest and clear the lock. Cut a 1/8" wide X 1/2" deep rabbet on the lower inside edges of the sides (T) and ends (U) to receive the bottom (V). Assemble the pieces with small finish nails and glue.

The two drawer fronts (W) are designed with a 3/8" overhang to stop the drawer and conceal the drawer opening (Figure 2). Your drawer openings should measure 10 1/2" X 3"— if they differ slightly, you'll need to alter dimensions. Allow 1/16" clearance all the way around for smooth operation. Cut the stock to size; then round over the front edges of the drawer fronts with a router. Cut

photos by the author

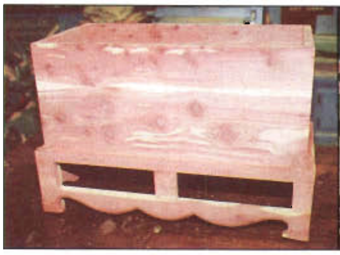
Petite Cedar Chest on Chest Cutting List

Qty	Part	Finished Size T	Finished Size W	Finished Size L	Piece
2	A	3/4"	11"	25"	upper chest front/back
2	B	3/4"	11"	12"	upper chest ends
1	C	3/4"	12 1/2"	25"	bottom
1	D	3/4"	13 1/2"	26 3/4"	lid
1	E	3/4"	3/4"	56"	lid trim material
2	F	1"	2"	3 1/2"	chest handles
1	G	3/4"	1"	27"	lower chest top rail
3	H	3/4"	2"	3"	lower chest spacers
1	I	3/4"	2 7/8"	27"	lower chest bottom rail
2	J	3/4"	7"	13 3/4"	lower chest ends
1	K	3/4"	6"	26"	lower chest back
4	L	3/4"	3/4"	6 3/4"	corner blocks*
4	M	1/2"	1/2"	11 3/4"	drawer guides*
4	N	3/4"	1 1/2"	11 3/4"	drawer supports*
1	O	3/4"	1 1/8"	56"	trim moulding
2	P	1 1/8"	1 1/8"	9"	front corner moulding
2	Q	1/4"	1 1/8"	9"	back corner moulding
2	R	3/4"	3/4"	23 1/2"	tray supports
1	S	1/2"	3/4"	23 1/2"	tray spacer
2	T	3/4"	2 1/2"	11 1/2"	tray sides
2	U	3/4"	2 1/2"	10 3/8"	tray ends
1	V	1/8"	9 7/8"	11 1/2"	tray bottom†
2	W	3/4"	3 1/2"	10 3/4"	drawer fronts
4	X	3/4"	2 7/8"	12"	drawer sides
2	Y	1/8"	9 1/8"	11 1/2"	drawer bottoms†
2	Z	3/4"	2 3/8"	9 1/8"	drawer backs
2	AA	1 1/2"	1 1/2"	1"	knob blanks

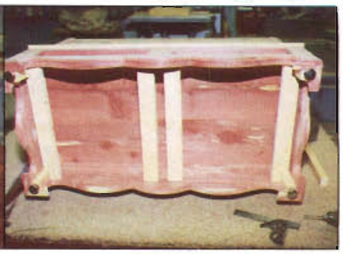
Supplies

1	lid support
2 pr	hinges
1	chest lock

*pine or poplar †tempered hardboard



The upper chest sits on the back of and inside the lower chest.



Notch the outer drawer guides to fit around the corner supports.

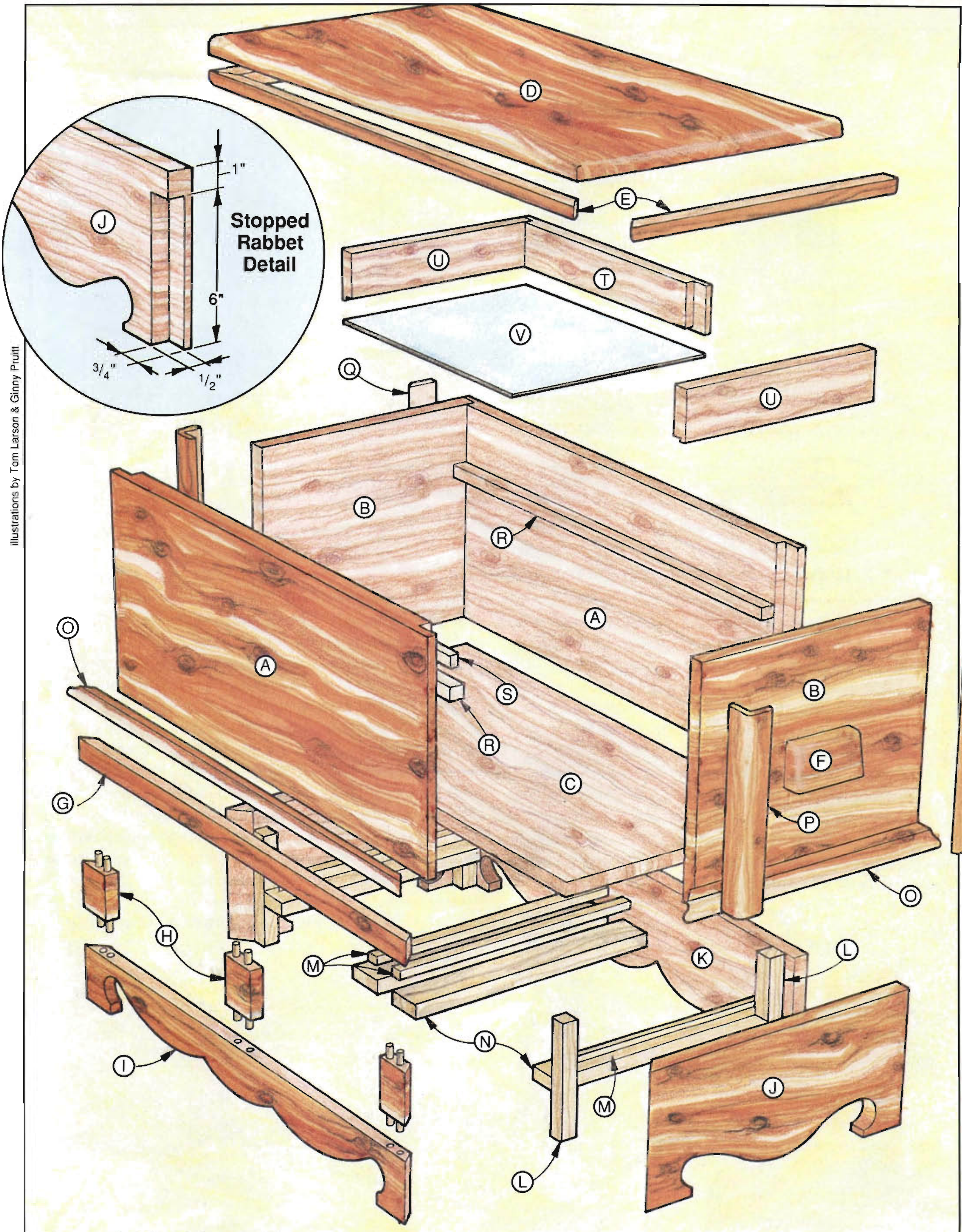


Figure 1. Chest Assembly

illustrations by Tom Larson & Ginny Pruitt

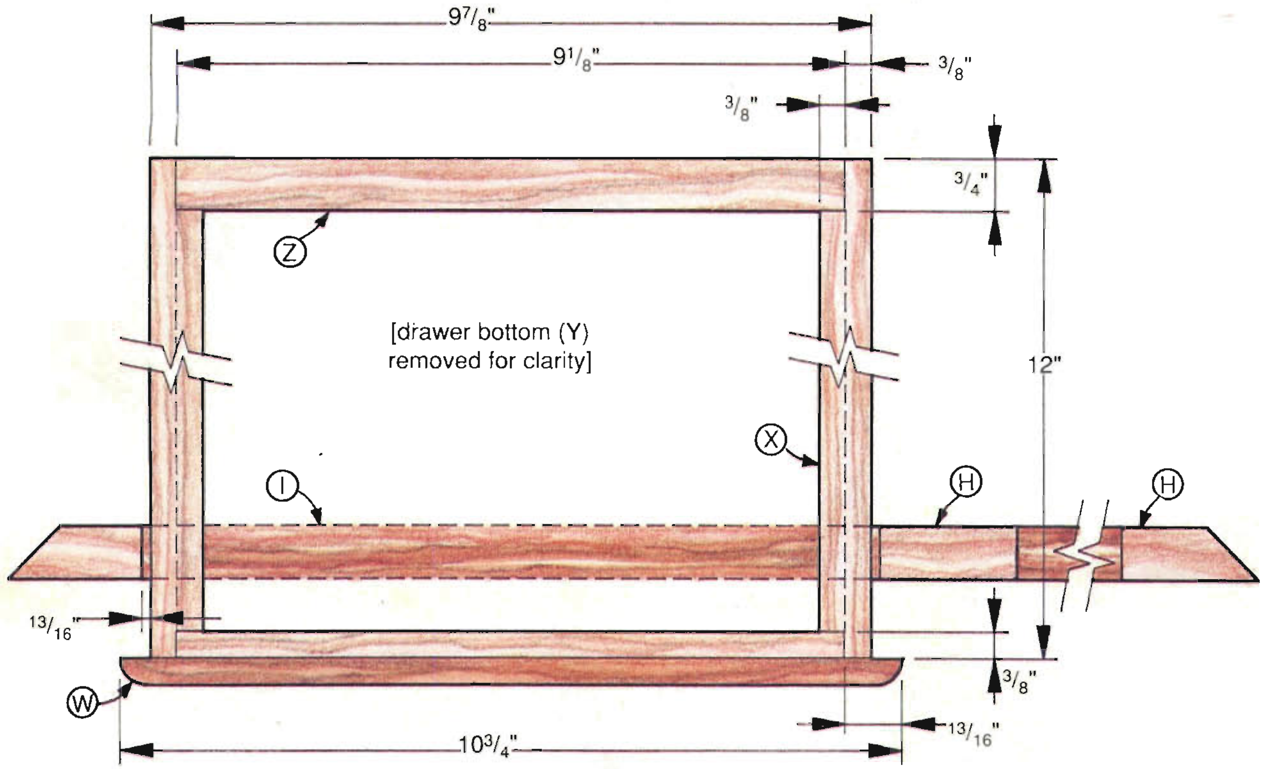


Figure 2. Drawer Dimensions and Clearances

$^{3}/_{8}$" deep X $^{3}/_{4}$" wide rabbets on the back ends of the drawer sides (X). Then re–set the dado blades to cut $^{13}/_{16}$" wide X $^{3}/_{8}$" deep, and rabbet the ends of the drawer fronts on their back surfaces. The width of this rabbet includes the $^{1}/_{16}$" clearance and a $^{3}/_{8}$" overlap. Re–set the blades again to cut $^{3}/_{8}$" X $^{3}/_{8}$", and rabbet the top and bottom inside edges of the drawer front and the front ends of the drawer sides (Figure 3).

I used plastic–laminated hardboard for the drawer bottoms (Y) and the tray bottom. Set up the table saw $^{1}/_{4}$" to $^{3}/_{8}$" from the fence and groove the drawer sides to accept the bottom. Then move the fence $^{3}/_{8}$" further from the blade to groove the drawer fronts (the extra $^{3}/_{8}$" accommodates the drawer front's lower edge overlap). The drawer backs (Z) will sit on the bottom and in the side rabbets. Assemble the drawers with glue and small finish nails. I turned the knobs (AA) from cedar remnants.

Give the chest a final sanding and it's ready for finishing. The cedar is so beautiful you may feel reluctant to put anything on it—I agree! Painting or staining it would be a crime. The only acceptable finish for a cedar chest is a clear one that enhances the wood's natural appearance; even then you should only put it on the outside. Leave the inside unfinished to retain that marvelous smell and cedar's rumored moth–repelling properties. I applied two coats of clear sanding sealer, sanding between coats with 320-grit sheets and wiping off the dust. I then applied two coats of Deft, polishing the final coat with pumice oil and wax to achieve a beautifully smooth and enduring surface. PW

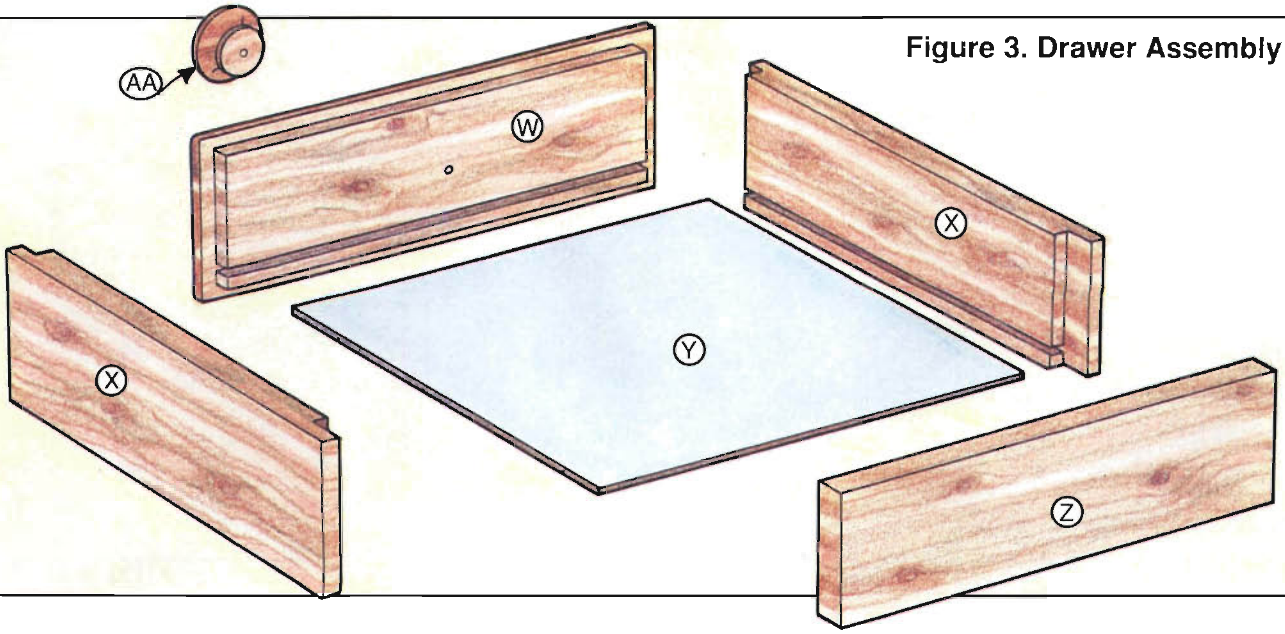
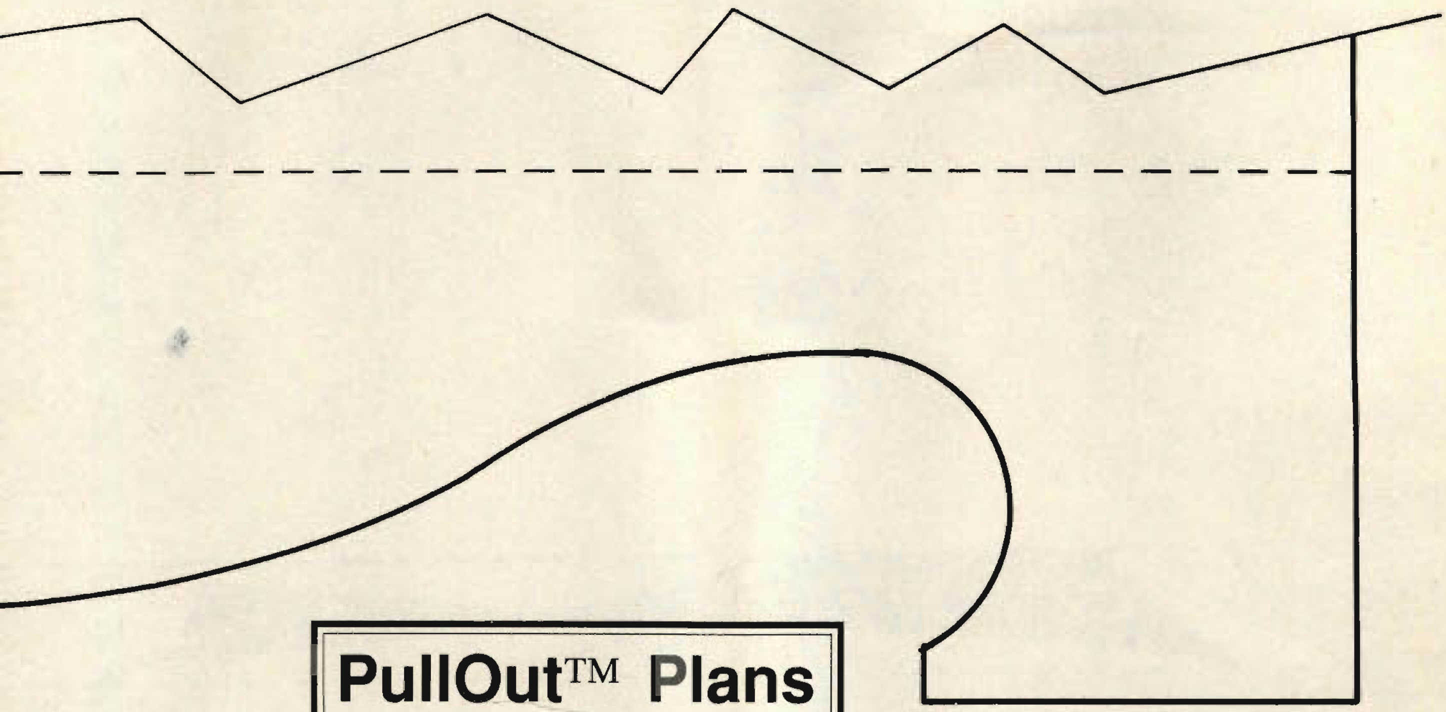


Figure 3. Drawer Assembly

illustrations by Tom Larson & Ginny Pruitt



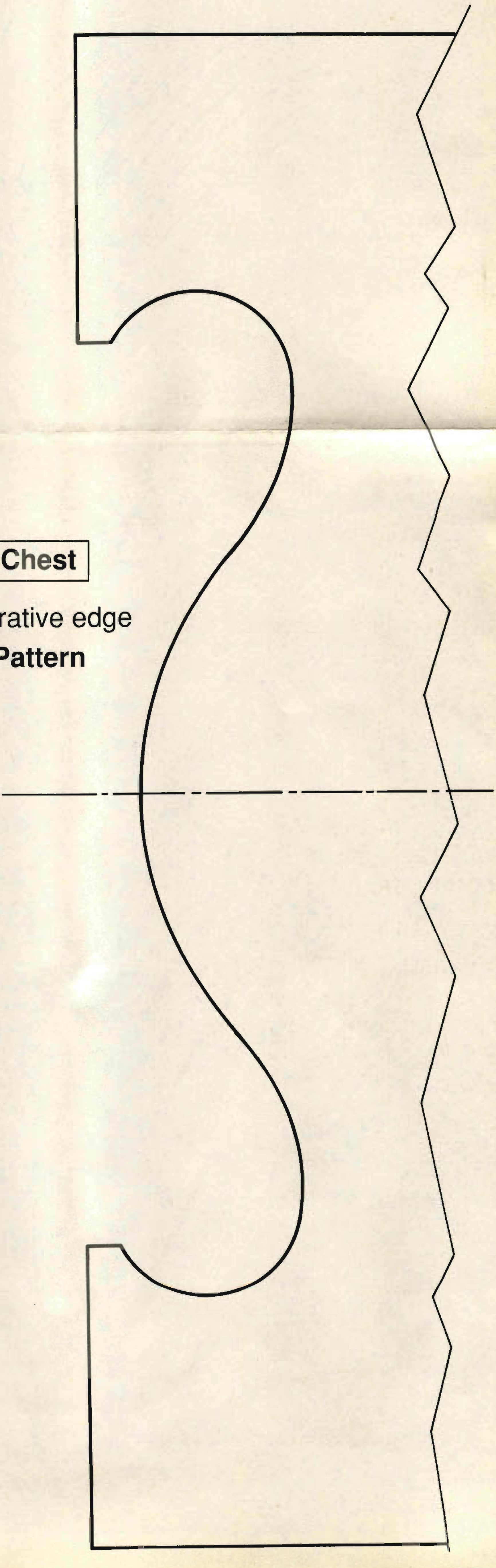
PullOut™ Plans

Popular Woodworking #58
January 1991
Pages 39—54

Chest on Chest

lower chest end—decorative edge

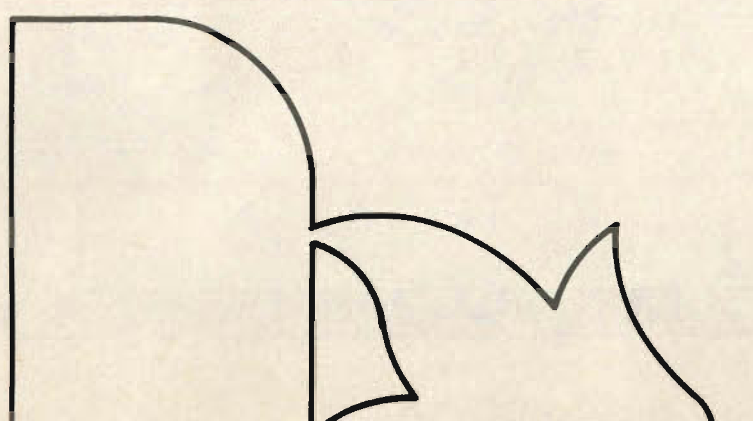
Full-Size Pattern

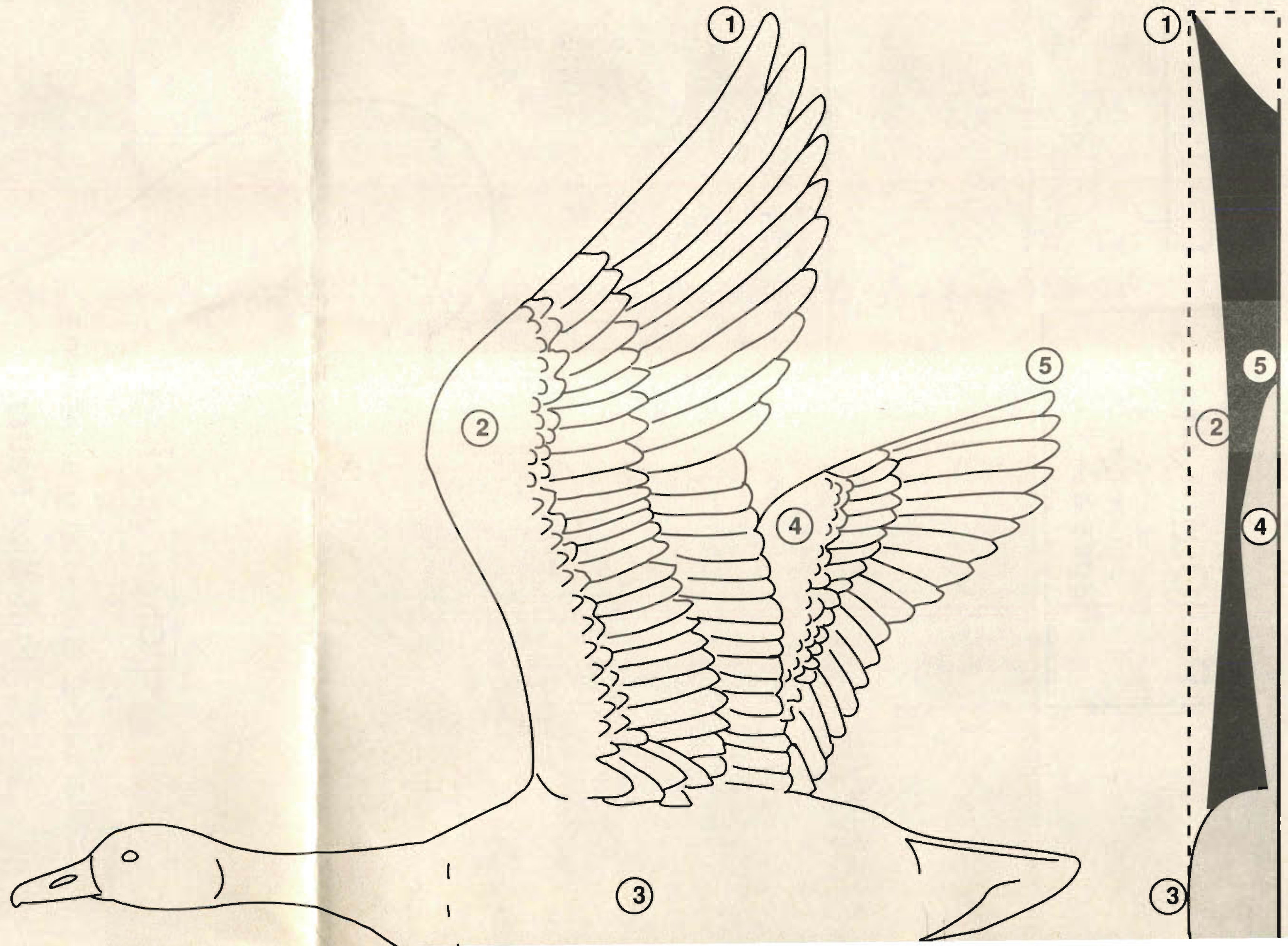


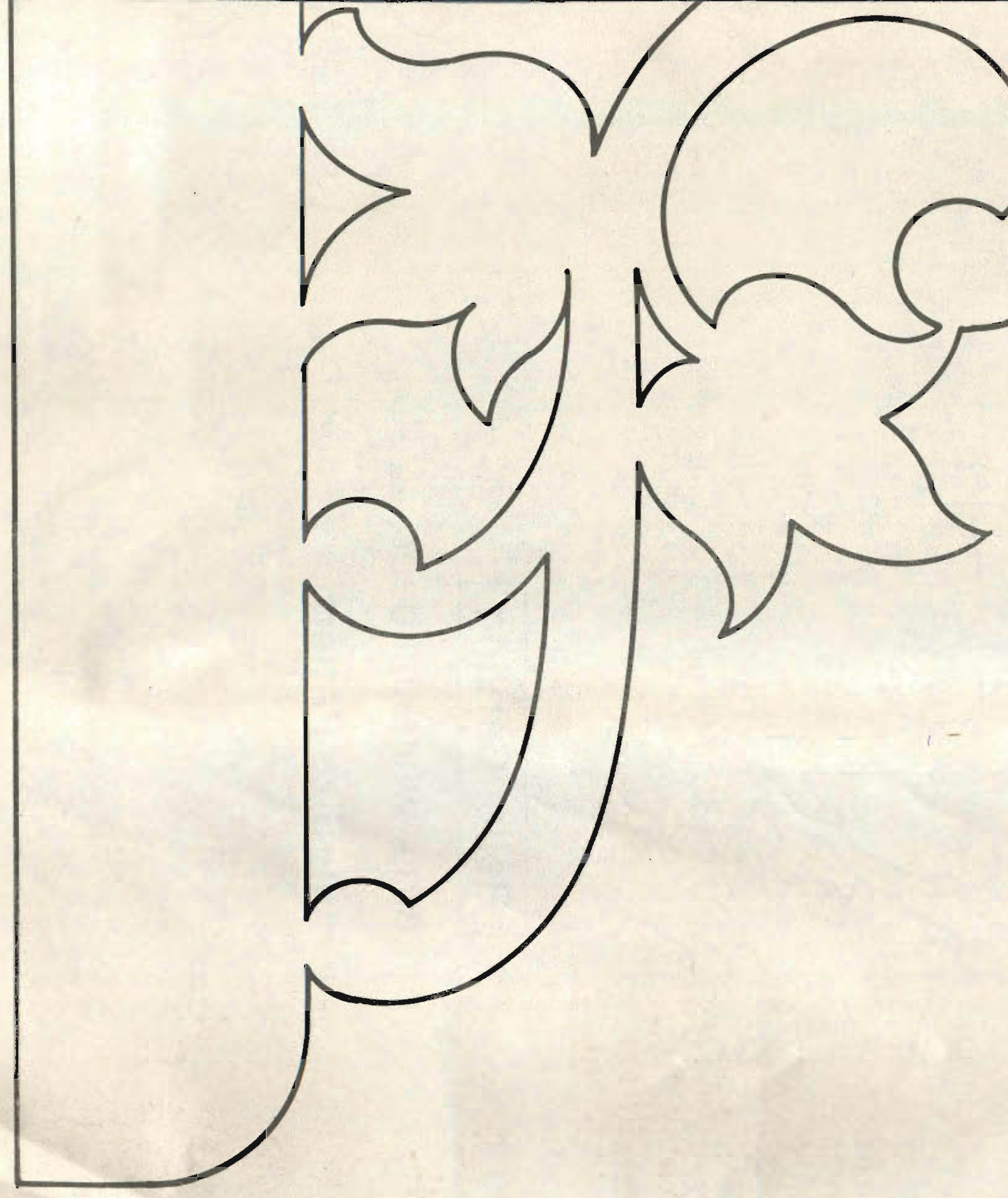
Carefully open staples to remove plans, then bend them closed again.

Whatnot Shelf

Full-Size Pattern



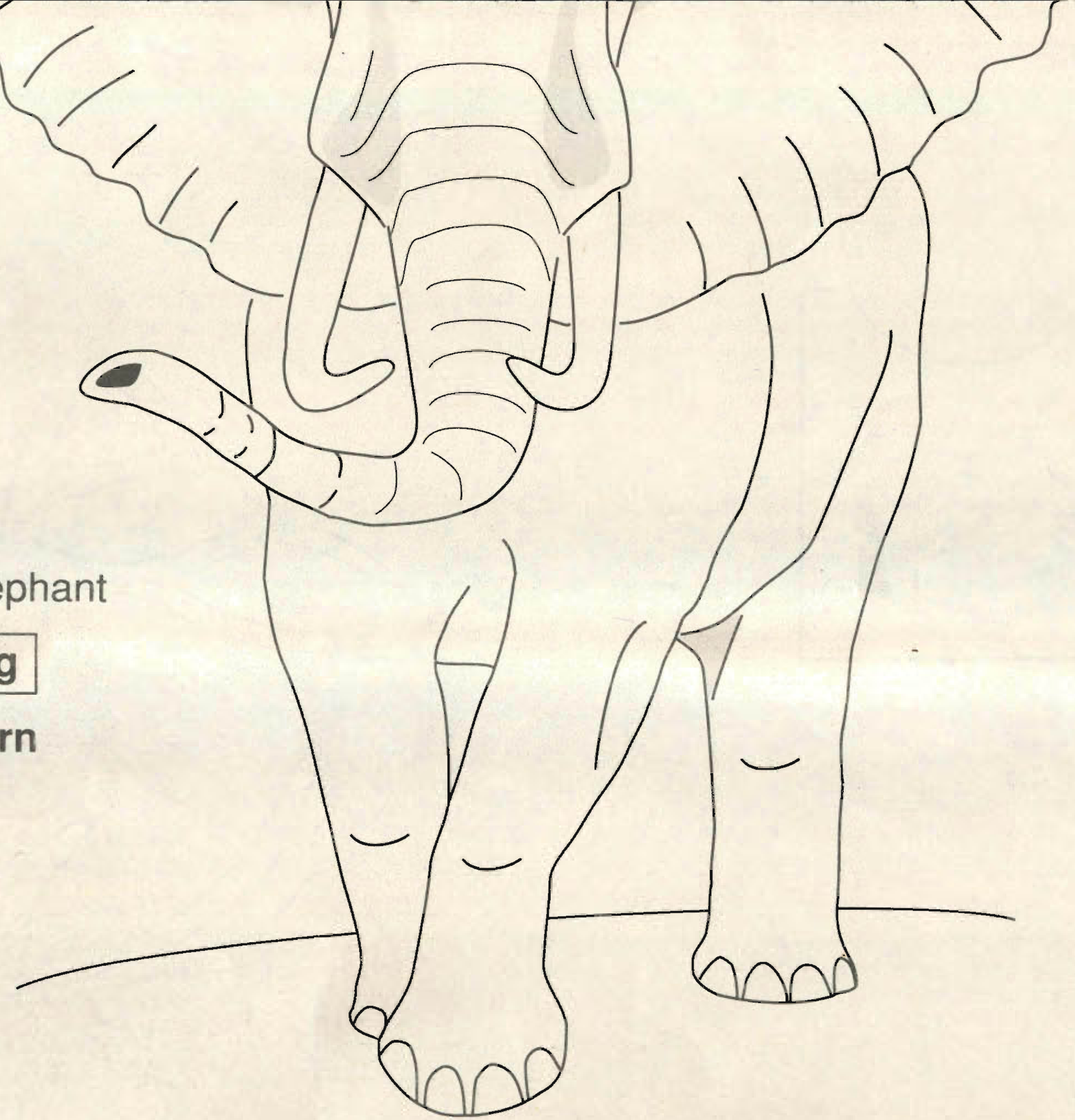




pattern 3 African elephant

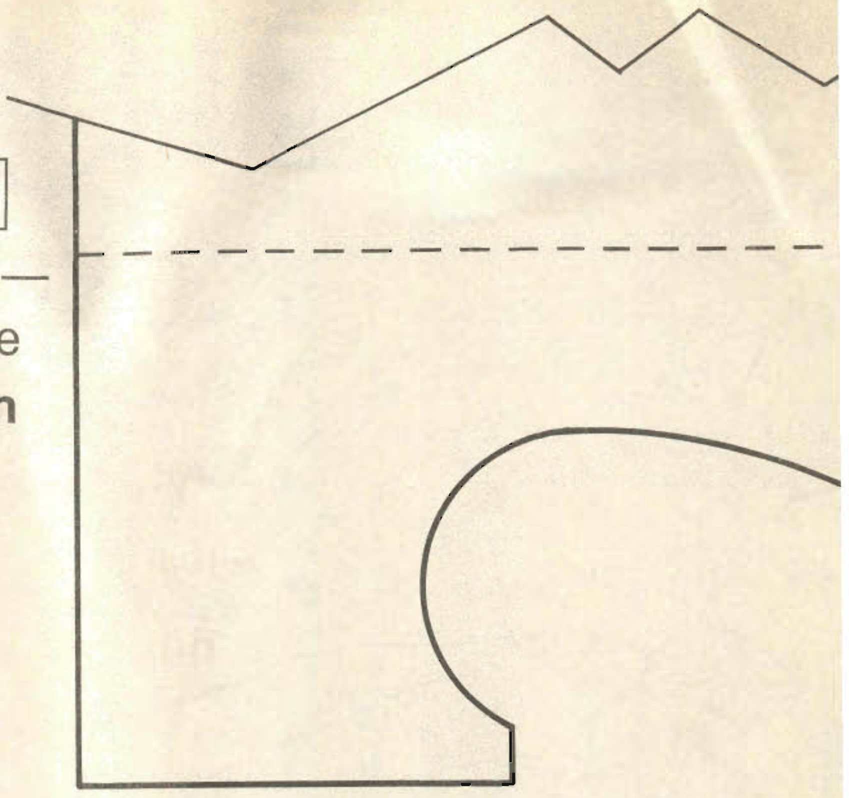
Relief Carving

Full–Size Pattern



Chest on Chest

lower chest bottom rail—
decorative edge
Full–Size Pattern



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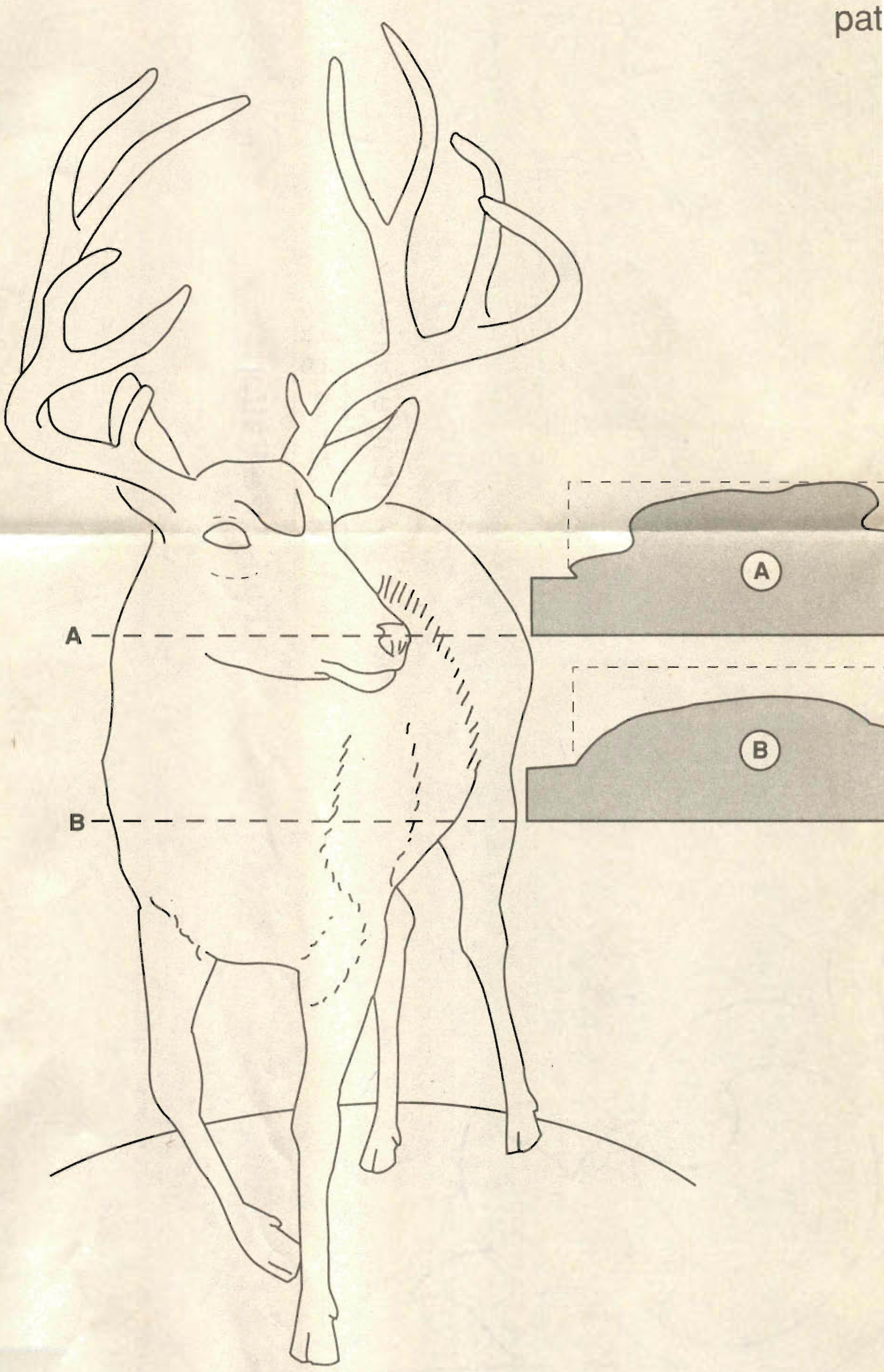
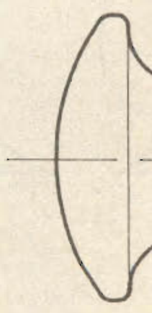
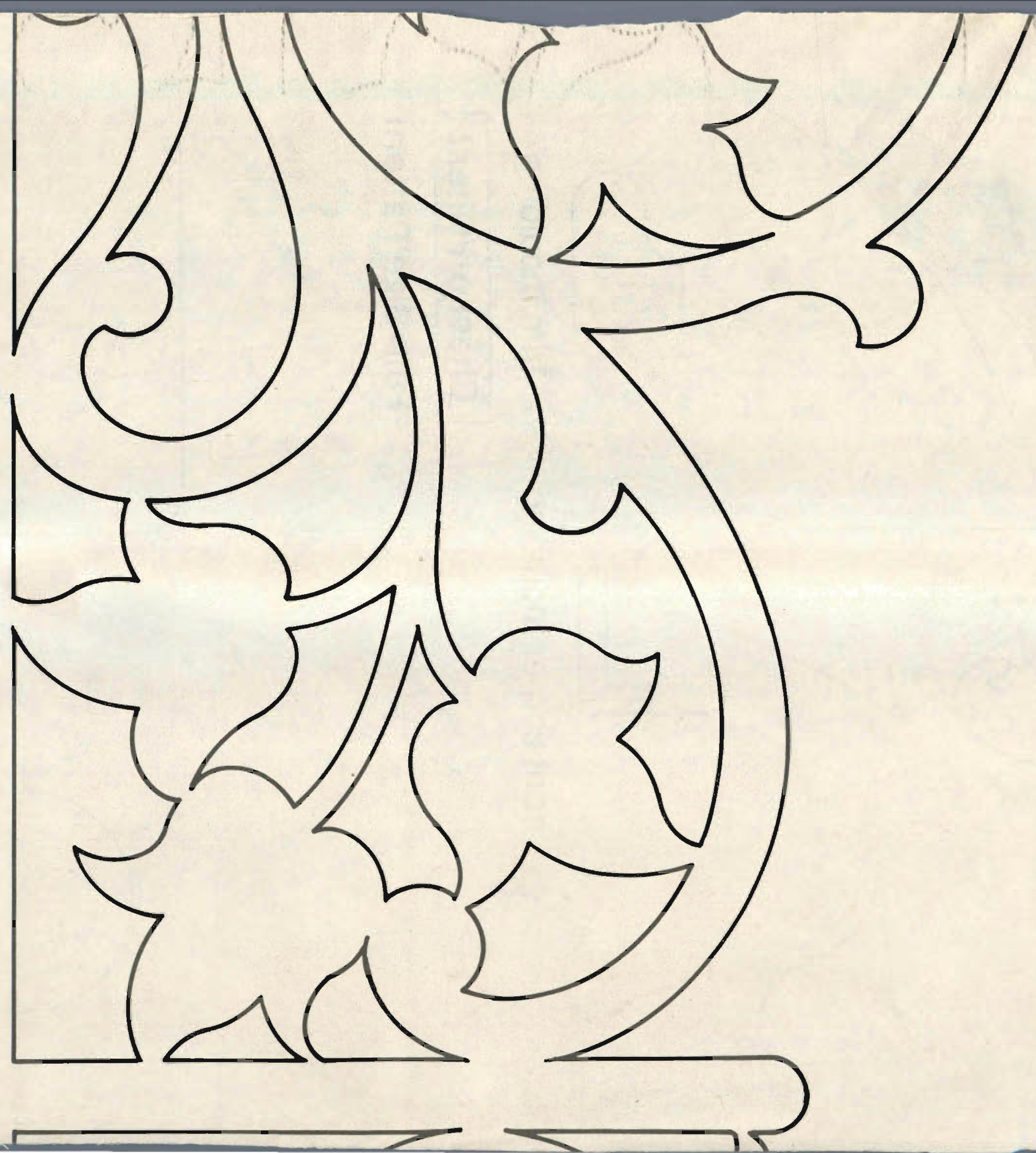
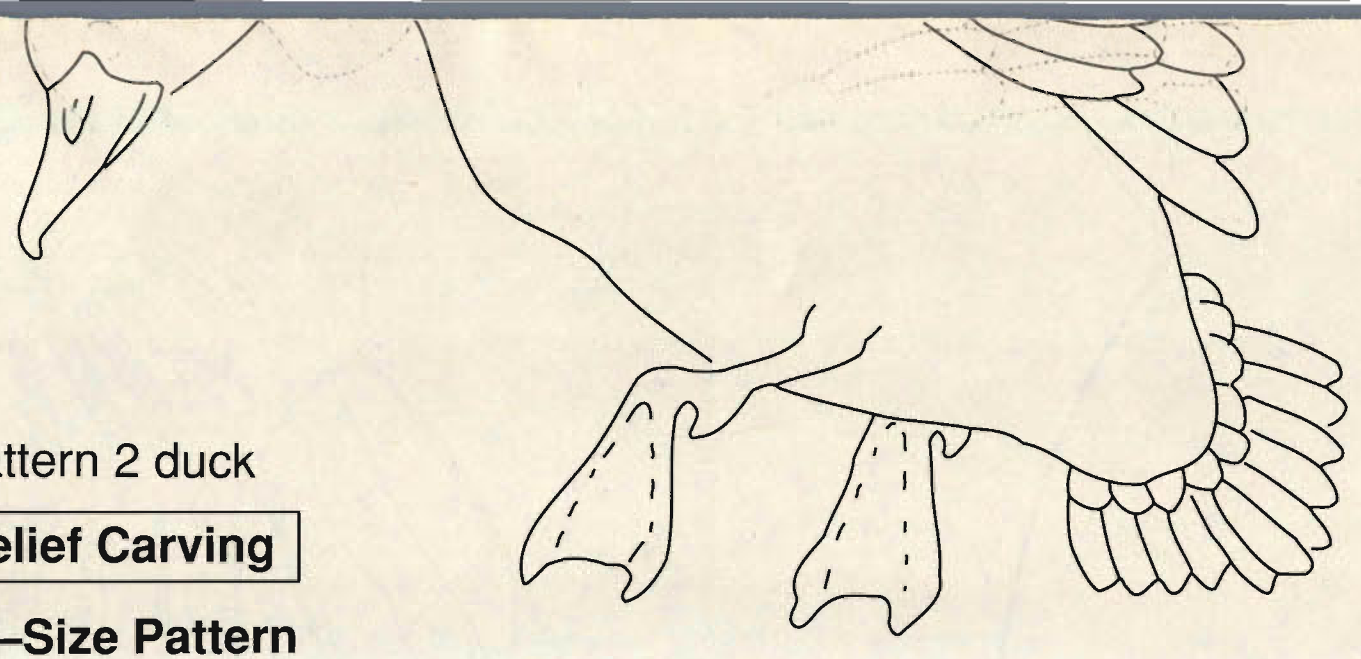


Relief Carving

pattern 4 white tail deer
Full–Size Pattern



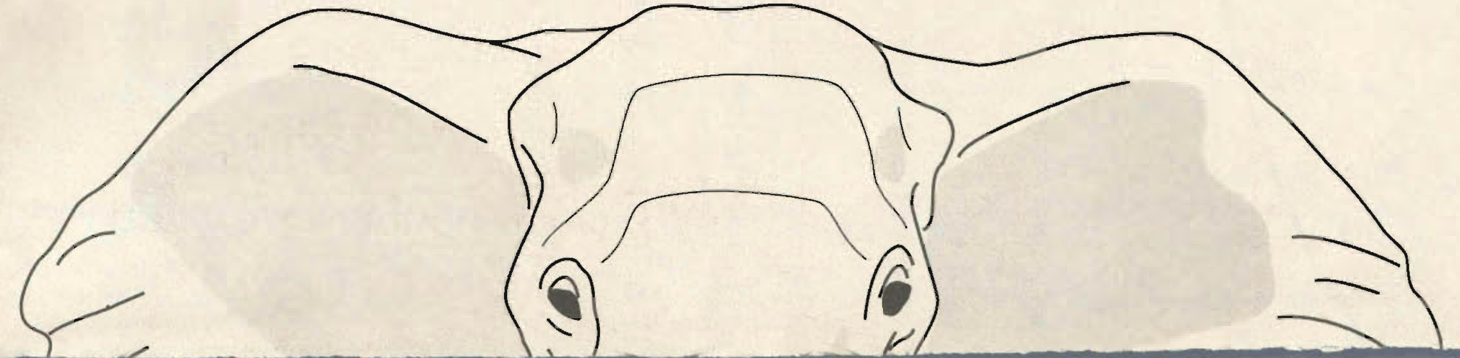


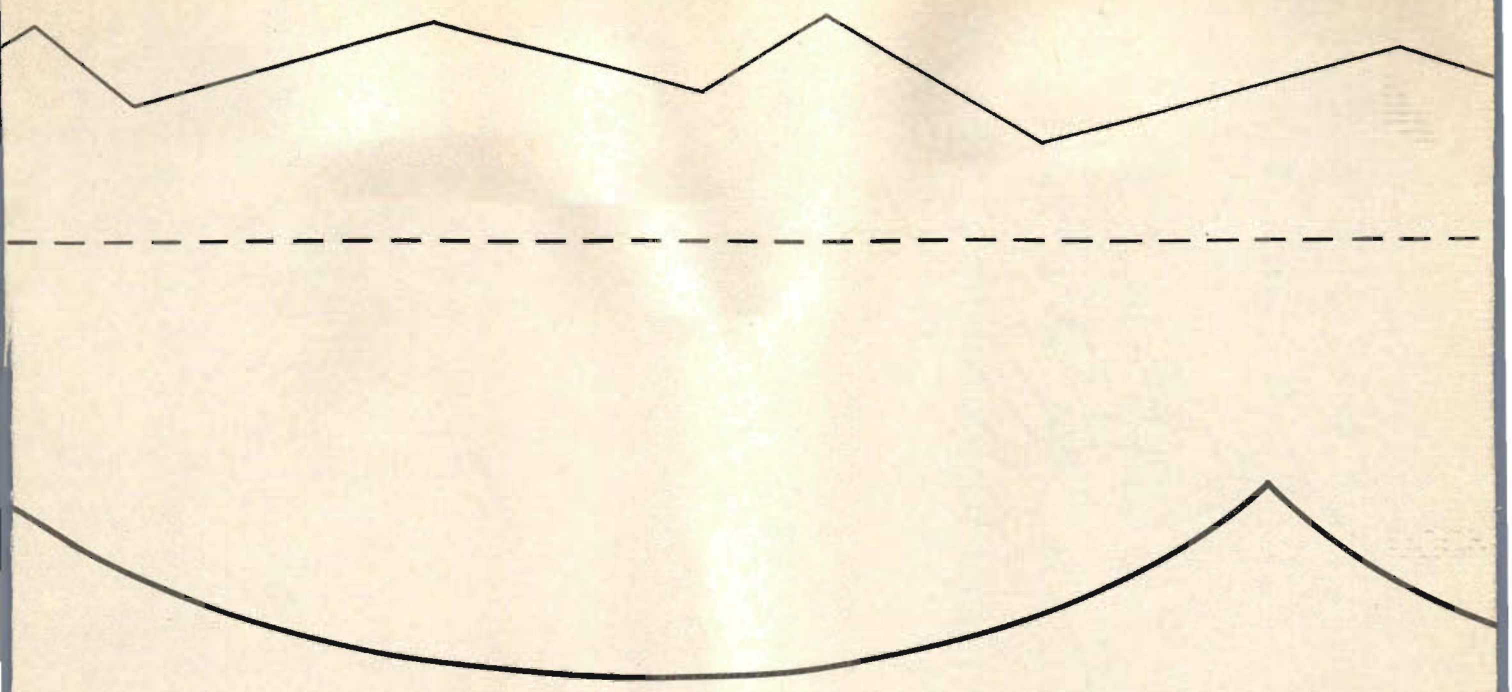


pattern 2 duck

Relief Carving

Full–Size Pattern

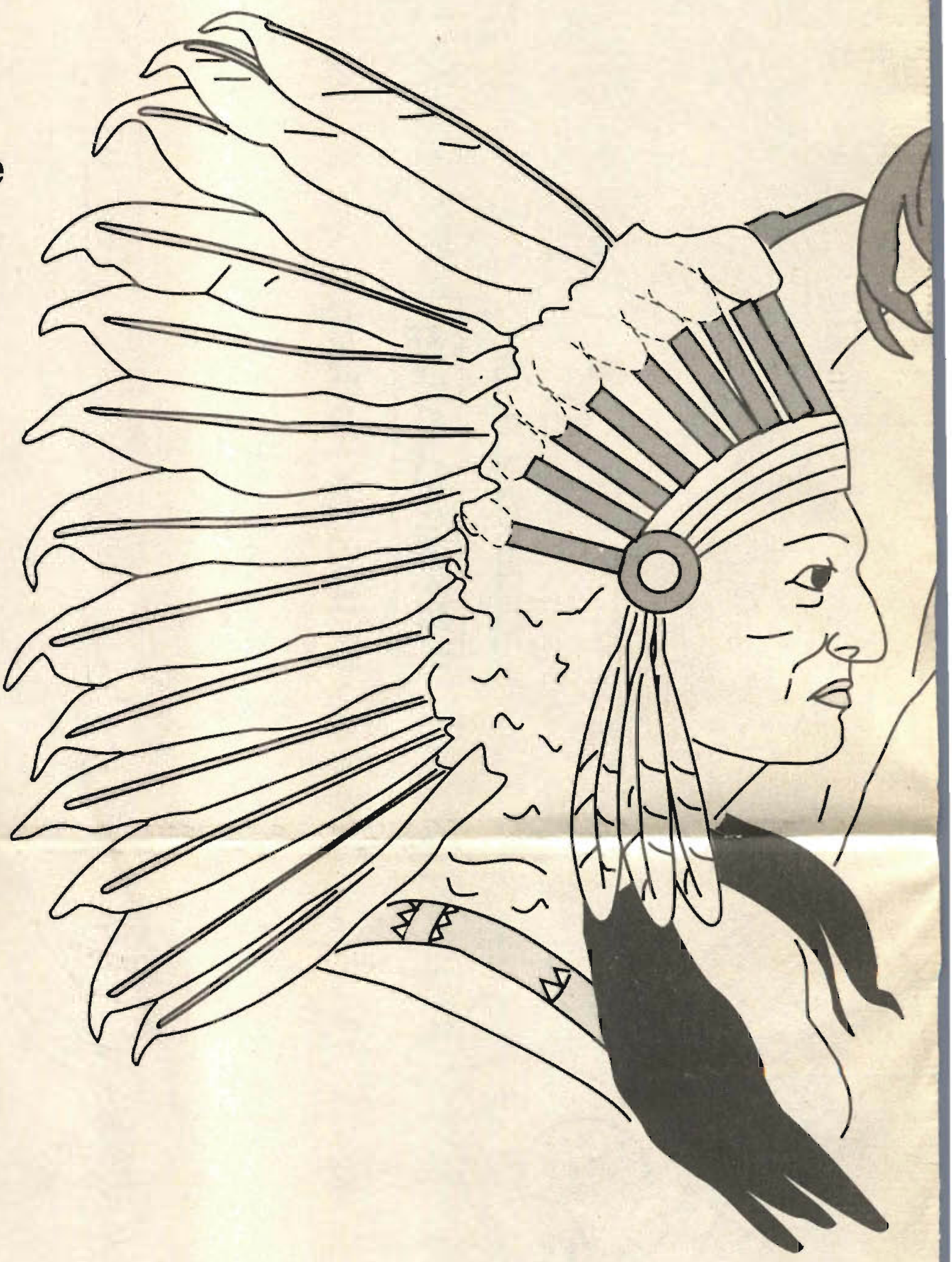


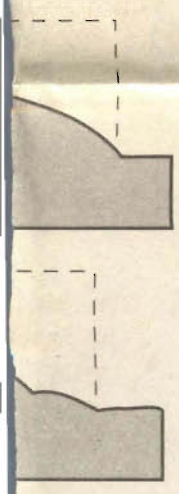


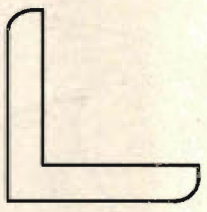
Relief Carving

rn 5 Indian and his horse

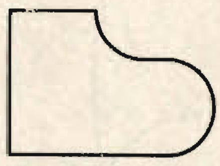
Full-Size Pattern







front corner moulding

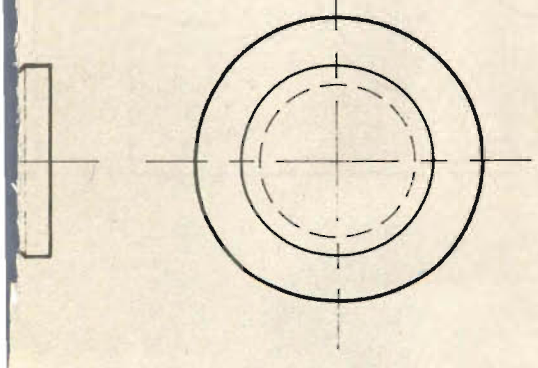


trim moulding

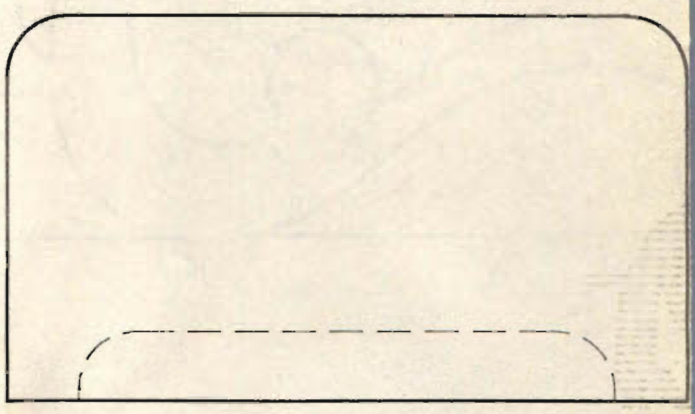
bac

Chest on Chest

Full-Size Pattern



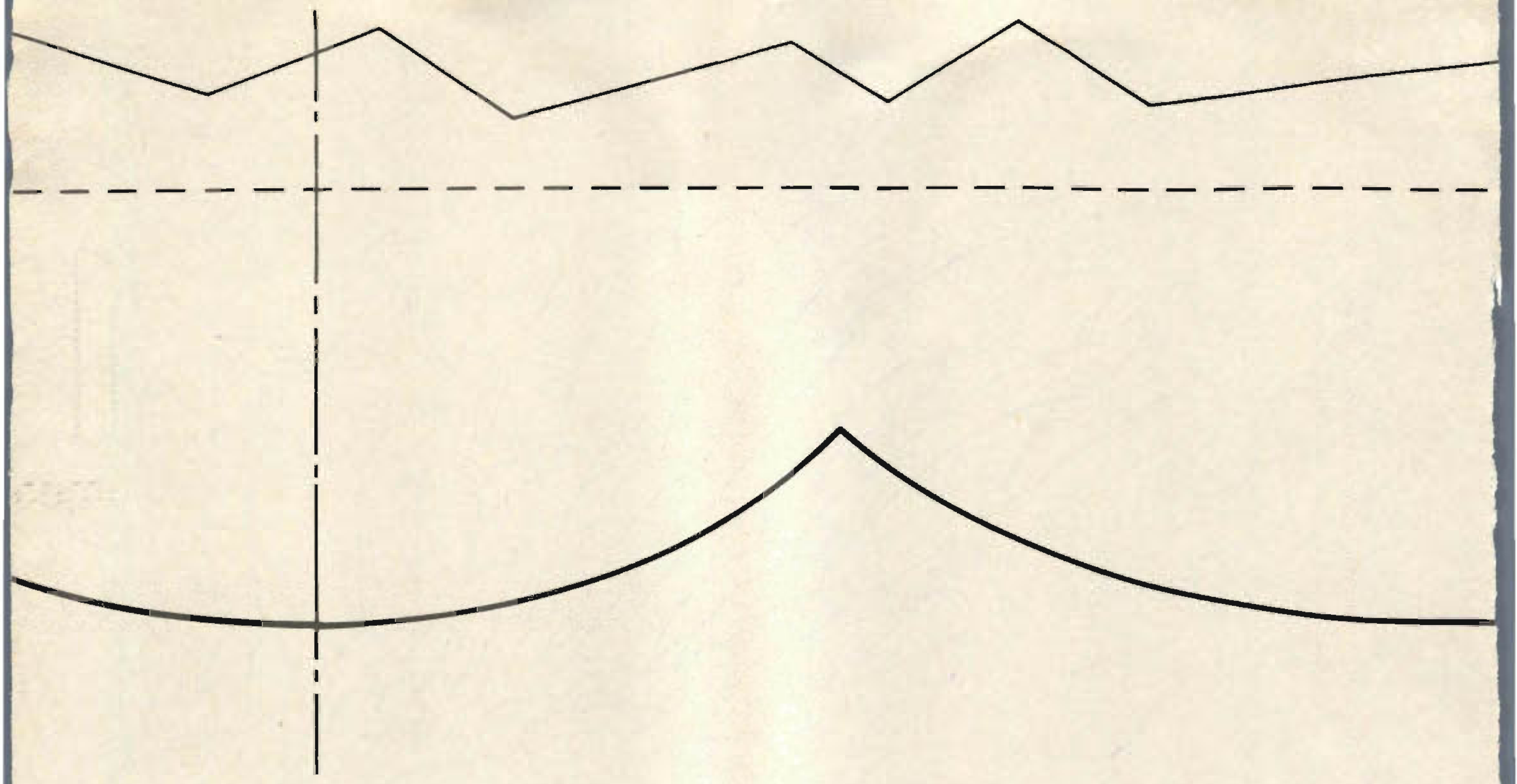
chest drawer knob

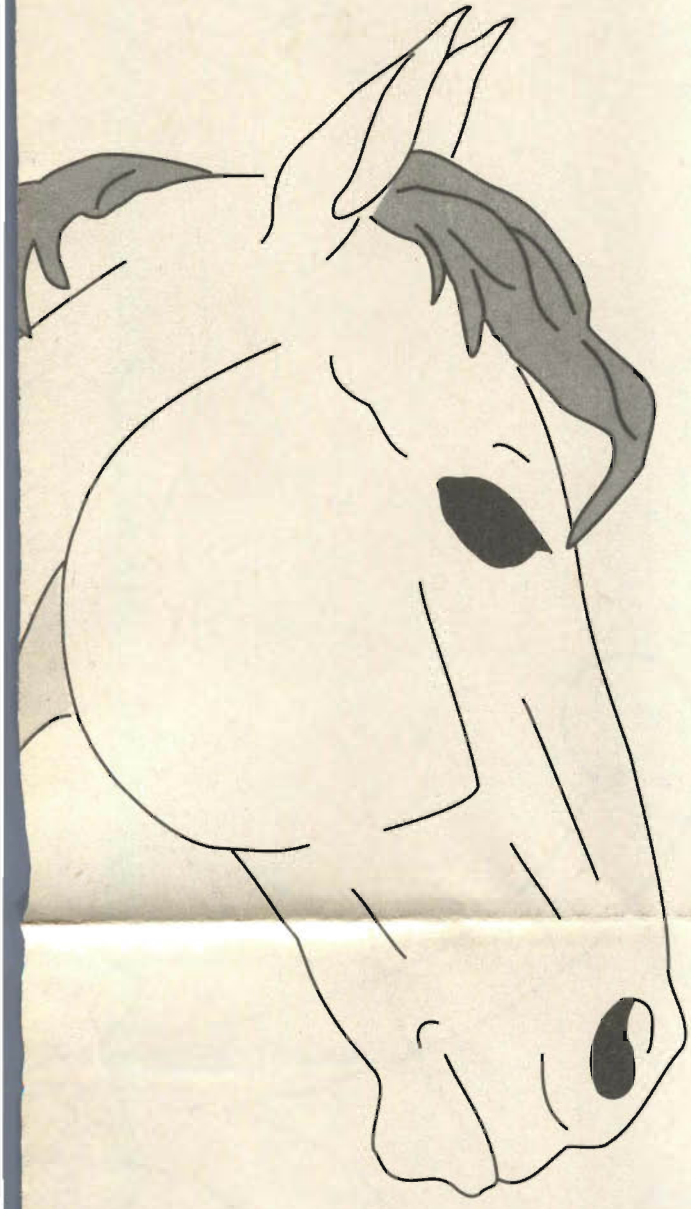


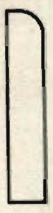
chest handle

Chest on Chest

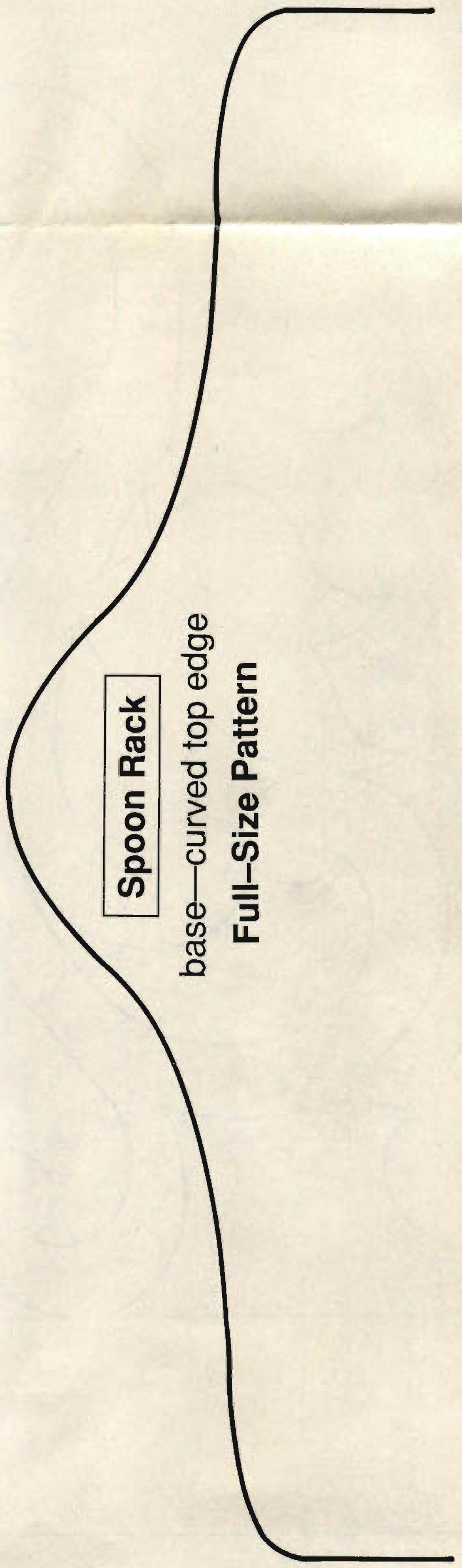
Full-Size Pattern







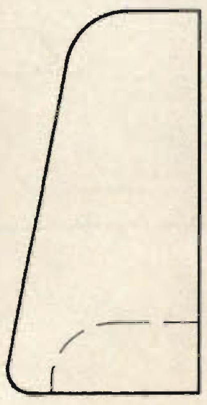
corner moulding

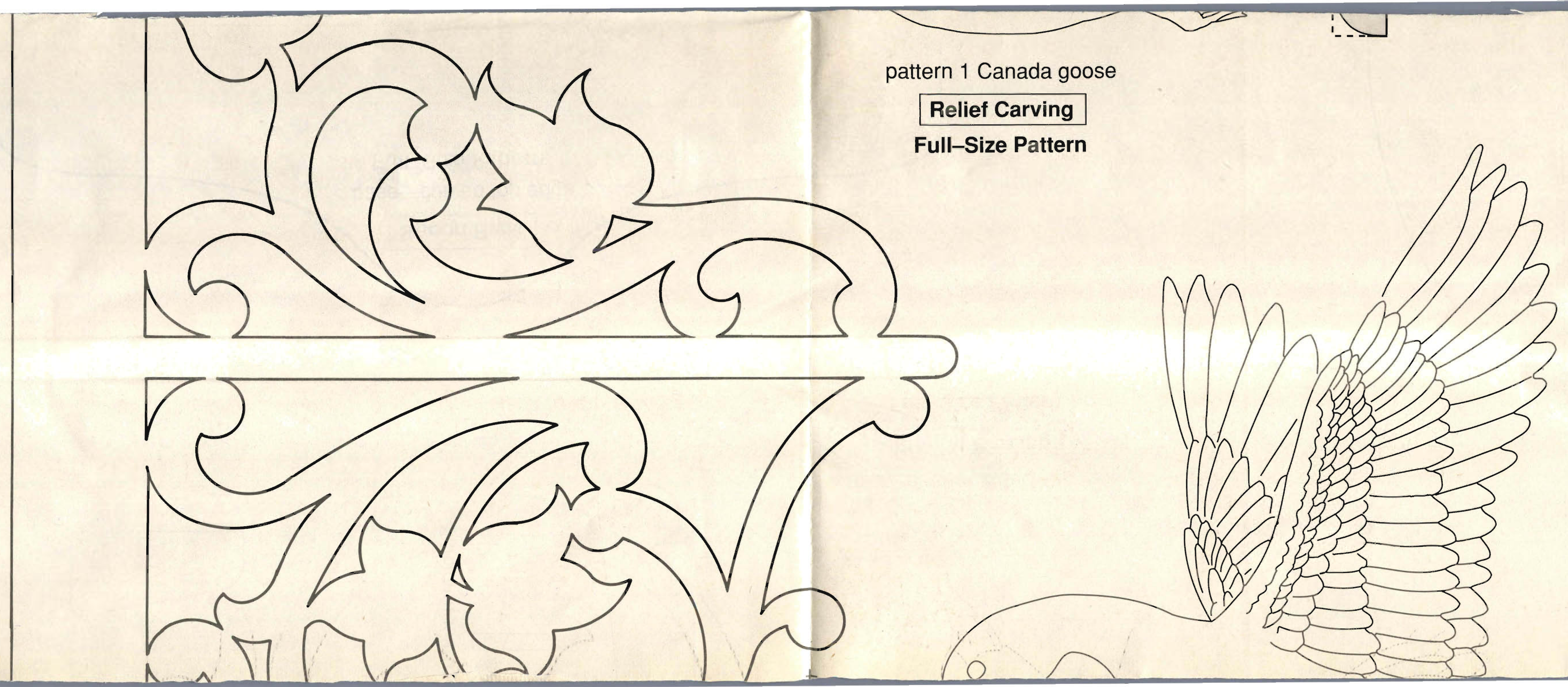


Spoon Rack

base—curved top edge

Full-Size Pattern





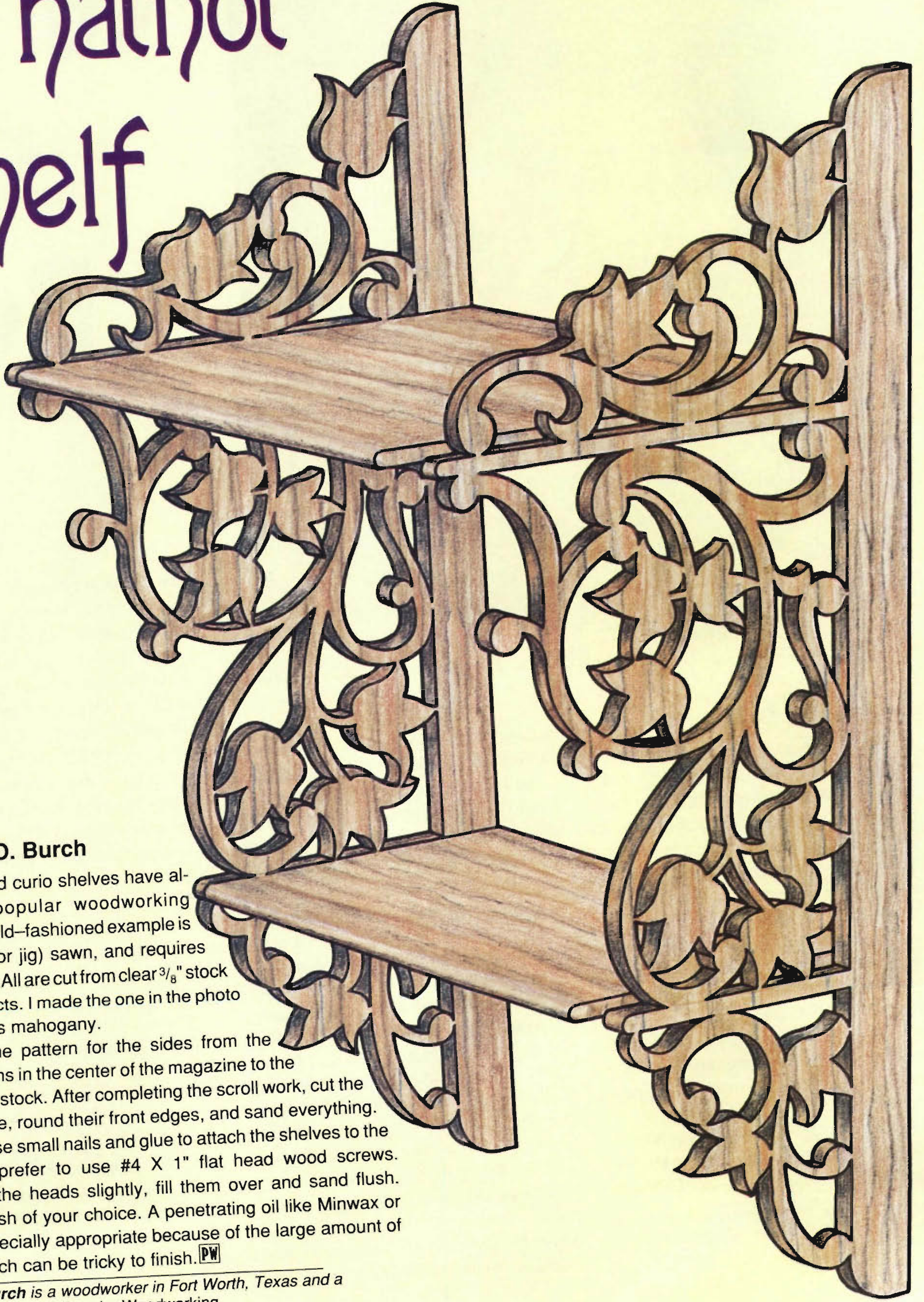
pattern 1 Canada goose

Relief Carving

Full–Size Pattern

A Popular Woodworking Project

Whatnot Shelf



by Devore O. Burch

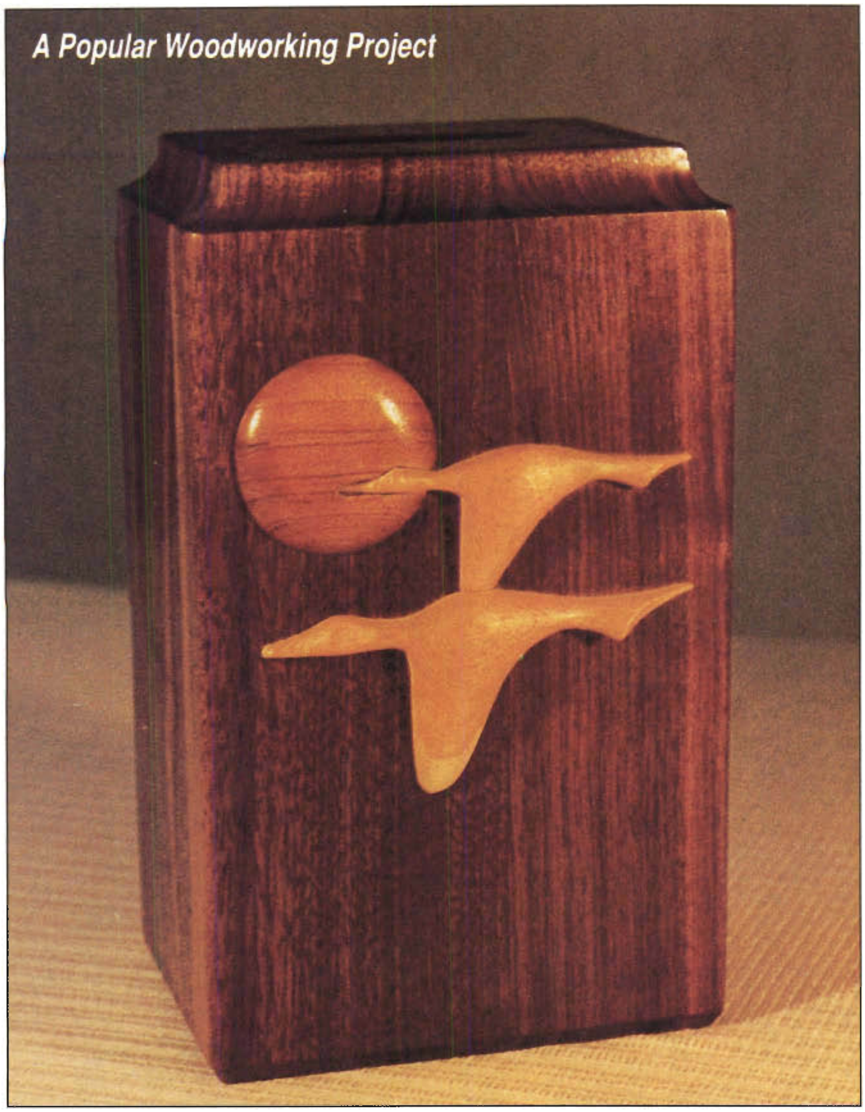
Whatnot and curio shelves have always been popular woodworking projects. This old–fashioned example is mostly scroll (or jig) sawn, and requires only four parts. All are cut from clear $^{3}/_{8}$" stock free from defects. I made the one in the photo from Honduras mahogany.

Transfer the pattern for the sides from the PullOut™ Plans in the center of the magazine to the surface of the stock. After completing the scroll work, cut the shelves to size, round their front edges, and sand everything.

You can use small nails and glue to attach the shelves to the sides, but I prefer to use #4 X 1" flat head wood screws. Countersink the heads slightly, fill them over and sand flush. Apply the finish of your choice. A penetrating oil like Minwax or Watco is especially appropriate because of the large amount of fretwork, which can be tricky to finish. PW

***Devore O. Burch** is a woodworker in Fort Worth, Texas and a frequent contributor to* Popular Woodworking.

Carved Coin Bank



A Popular Woodworking Project

by James E. Seitz

For a design you can bank on, try adding a little decorative carving to the otherwise plain face of a coin bank. A well positioned carving imparts a unique appearance to the flat surface, and the result is not only attractive but functional. The sliding door underneath allows for easy access and removal of coins.

Carving decorative overlays is easier than you might think—all you need is a scroll saw, a sharp knife, and a little patience. The two parts—bank and overlay—are made separately and from contrasting woods. I recommend walnut for the bank, cherry for the moon, and pine for the flying geese.

Begin by planing down the stock for the bank to $^{5}/_{8}$" thickness, and shape the front and back (A), sides (B), the top (C) and the bottom block (D) as dimensioned in the Cutting List. A piece of $^{1}/_{4}$" plywood will serve for the slide (E), with a short dowel rod (F) inserted at its center point for use in shifting the door from side to side. After shaping the pieces, drill $^{1}/_{8}$" diameter holes into the top to form the ends of the 1$^{1}/_{2}$" coin slot. Connect the holes with a scroll saw and taper the upper edges of the slot with a chisel or router to provide easy entry for coins. Dado the sides $^{1}/_{4}$" deep X $^{5}/_{16}$" wide, $^{3}/_{4}$" from the bottom edges, for the slide.

Assemble the pieces using butt joints. Other joints could be used, but today's wood glues are strong enough to make possible use of the simpler, squared joint. Put glue on three edges of the bottom block (D) and the two long edges of one side (B). Clamp the side between the front and back (A), and position the bottom between these three pieces so that it is above the slide groove. Take care that no glue oozes into the slide groove. Now run a bead of glue around all four edges of the top (C) and fit it in place. Before installing the last side, slip the slide (E) into the groove. When the glue is dry, sand the top of the assembled bank on a disk or belt sander so the ends of the four sides are flush with the top surface. Rout the detail around the top edge with a $^{1}/_{2}$" radius cove bit that has a guide bearing. Finish sand the whole bank and add a slight chamfer to the bottom edge.

I used $^{3}/_{8}$" cherry for the moon and $^{1}/_{2}$" soft pine for the geese. Using the pattern above, trace the outlines of the figures onto the woods, keeping the grain lengthwise in the geese and parallel to their line of flight in the moon. Use a scroll saw to cut them out.

A sharply honed knife is essential for shaping the figures. For the most part, they can be held by hand, but you can also place the flat side on a non-skid surface while carving. Shape the contours so that the bodies of the geese will be thicker than their heads and tails. Make the small goose thinner overall than the large one in order to create a sense of depth.

Before you round the edges of the moon, trace and saw out a slot where the head of the smaller goose overlays it. This

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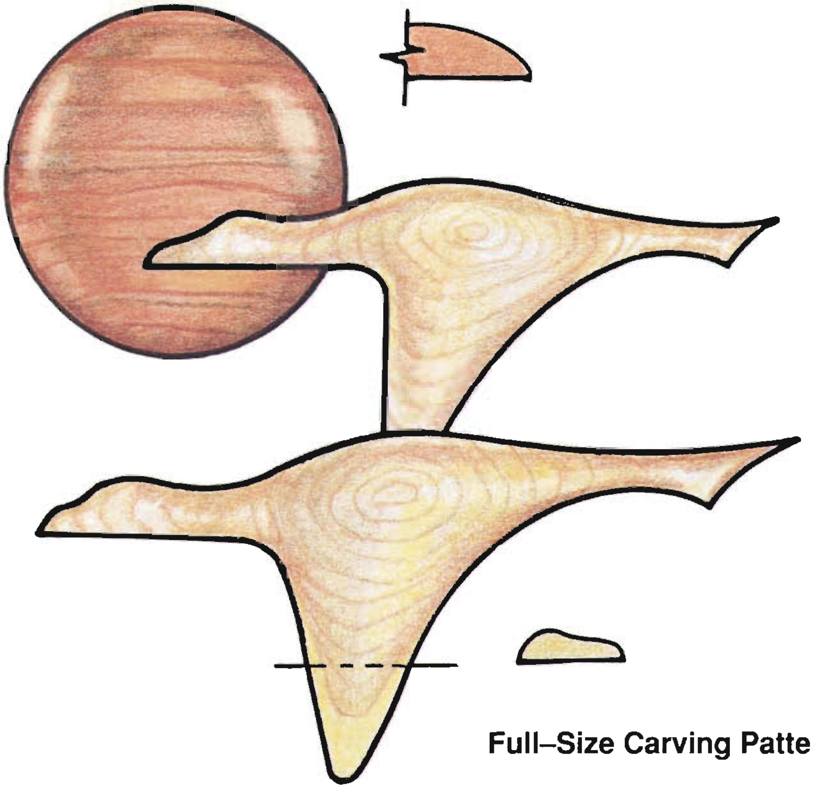
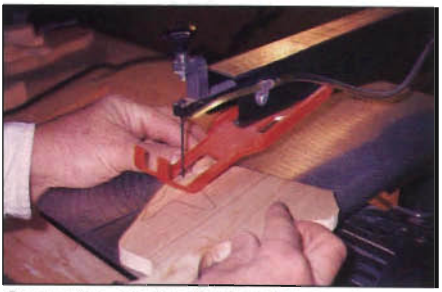
James E. Seitz, Ph. D., is the author of *Woodcarving: A Designer's Notebook*, Sterling Publishing Co.



Full–Size Carving Pattern

photos by the author



Cut out the carving blank on the scroll saw.

Hold the blank against a foam pad to improve control while carving.

Carved Coin Bank

Cutting List

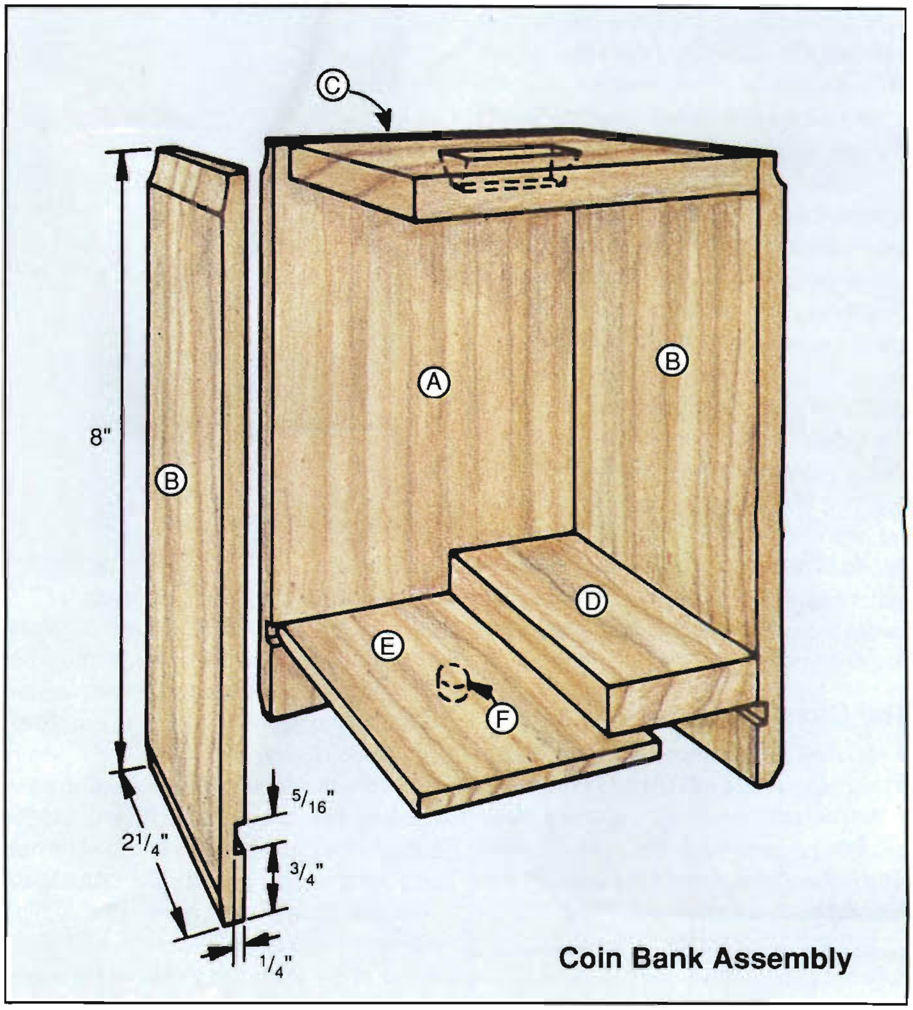
Qty	Part	Finished Size T	W	L	Piece
2	A	5/8"	5"	8"	front/back
2	B	5/8"	2 1/4"	8"	sides
1	C	5/8"	2 1/4"	3 3/4"	top
1	D	5/8"	2 1/4"	2 1/4"	bottom
1	E	1/4"	2 1/4"	2 5/8"	slide
1	F	3/8" diameter		1/2"	dowel

inlaying of the head gives unity to the overall design.

Complete the carving before gluing the overlay onto the front of the bank. For best visual effect position it a little above center. A quick–drying household glue or contact cement works well here. The advantage of this type of glue is that no long clamping period is necessary. If you do use a slower setting glue, you can clamp the overlay by weighting it with a small sack of sugar, flour, or sand.

I recommend finishing with several coats of satin polyurethane. As a final touch, apply pieces of felt or rubber–headed tacks at the four corners of the bank's base. PW

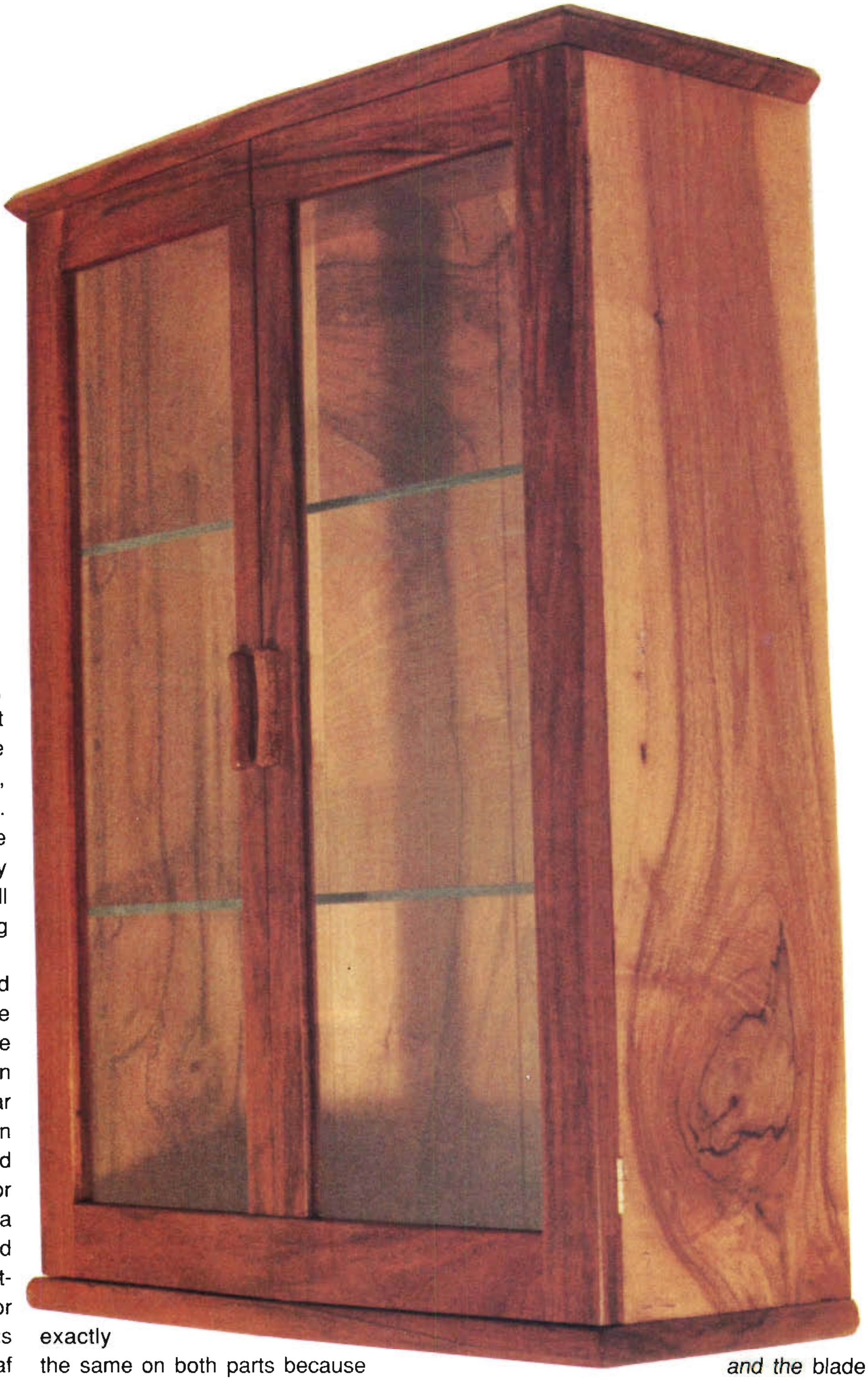
illustrations by Bob Chapla and Ginny Pruitt



Coin Bank Assembly

A Popular Woodworking Project

Show Off Your Treasures



by Ken Sadler

Most people have treasures, small things they've gathered over the years, that they value. What they usually don't have is a proper place to display these treasures so they can enjoy them. Well, here's a chance to create such a place. This showcase cabinet is a comfortable size for most homes and it's really not very difficult to put together. It will test your skill a bit because it has a few interesting departures from the ordinary.

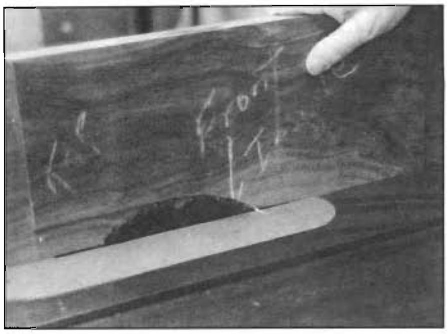
You can make it out of any kind of wood you want to, but it's my contention that the case should be just as much a showpiece as the things in it. If you agree with me on this, then you'll be much more particular about the wood you choose. The cabinet in the pictures is made from black walnut and English walnut. English walnut is good for this type of piece because it has such a strong contrast between the sapwood and heartwood; thus you're apt to find interesting and distinct grain patterns as I did for the sides and back. There are other woods that have this contrast; Oregon big leaf maple is one. You might also try red gum if you can find it.

The Case

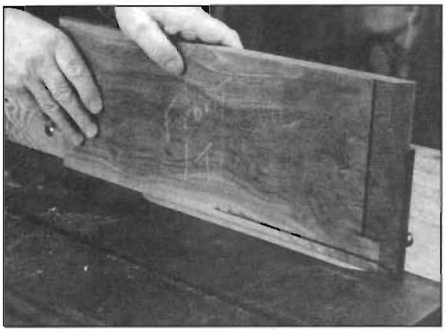
The two most important parts of this showcase are the top (A) and bottom (B). If they're not done right, you will never be able to square up the case. The key here is the dimensions of the area left after the rabbets have been cut. They must be exactly the same on both parts because the shoulder of the side rabbets positions the sides, and the shoulder of the front rabbets positions the doors. However, the overall dimensions of the parts are different, as you'll note in Figure 1. This means that while the depth of the rabbets on each are the same, the width is different. Cut the parts to their overall sizes and joint the top and bottom faces smooth. The rabbets are best cut on the table saw. Use a high auxiliary fence and a planer blade. Set the fence at $^{3}/_{4}$" from the inside of the blade and the blade height at $^{3}/_{4}$" for the bottom and 1$^{1}/_{8}$" for the top. Test each setup with a piece of scrap. Run the side rabbets first and then the front. If you've been careful to cut to the overall dimensions shown on the drawings, the un–rabbetted areas will be the same. Check them to be sure, and if there is a discrepancy, correct it now.

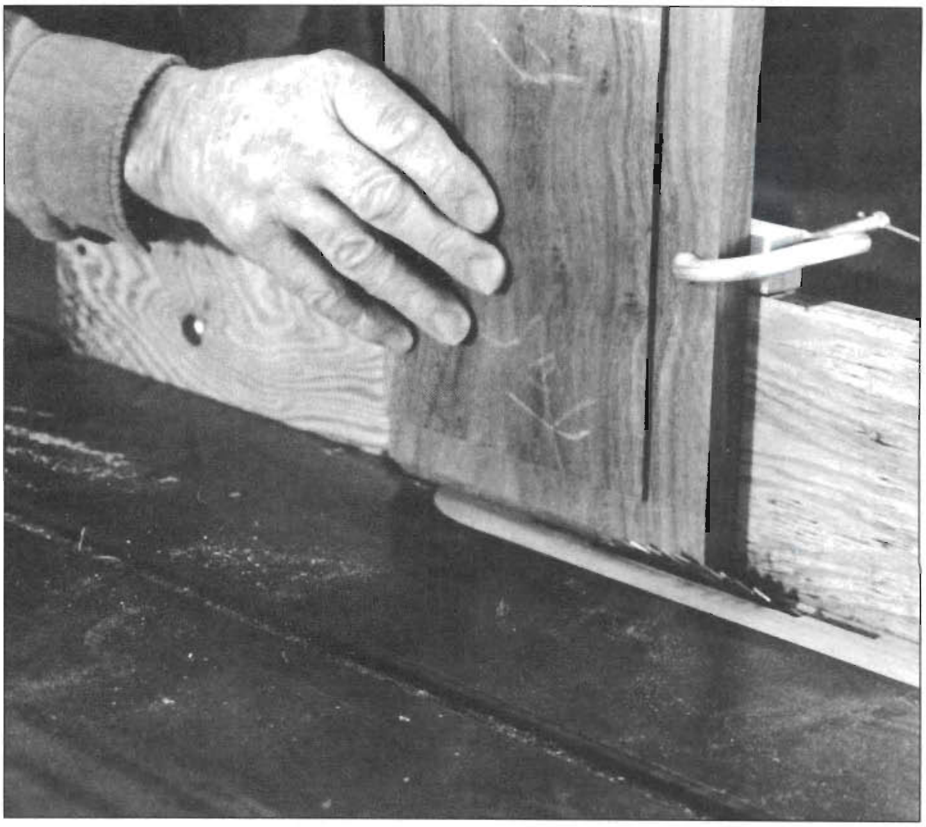
The next step is to bevel three of the edges of the top. Notice that the bevels are not the same size. The easiest way to do this is with the table saw, using the planer

***Ken Sadler** is a retired custom furnituremaker in Portland, OR.*



Attach a high auxiliary fence to rabbet the top and bottom.
Move the fence to the other side of the blade to bevel the edges of the top.
Clamp a board square to the material to guide and support it during the cross-grain bevel cuts.





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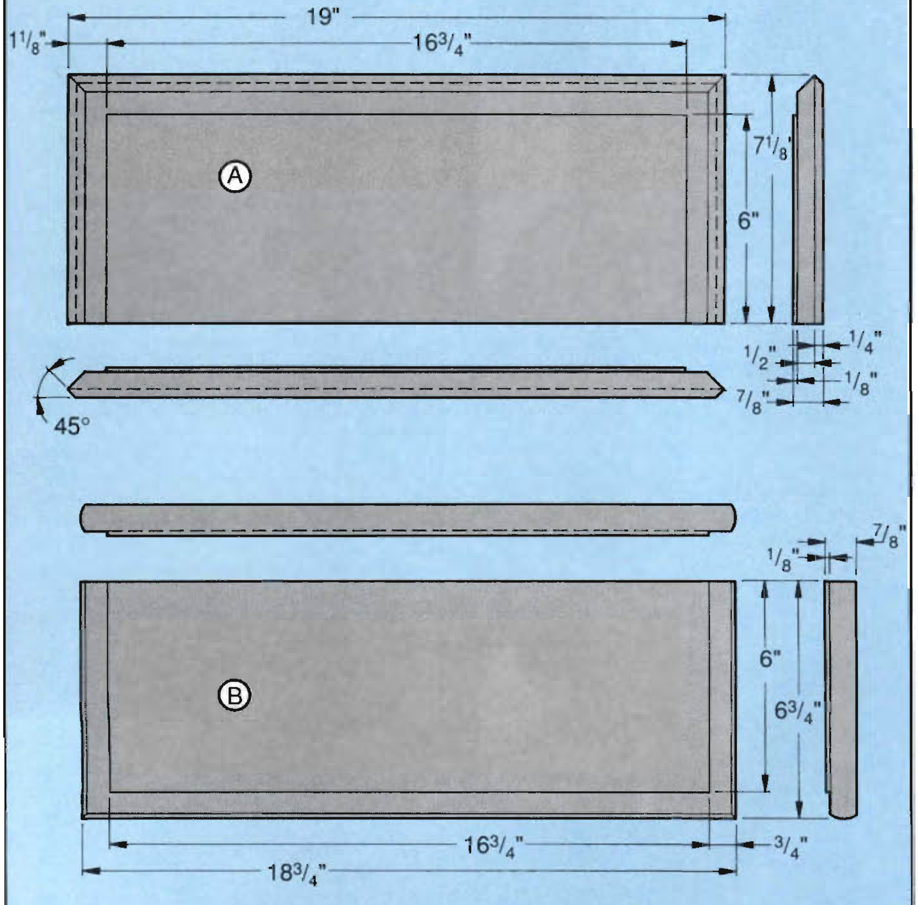


Figure 1. Dimensions of the Top and Bottom

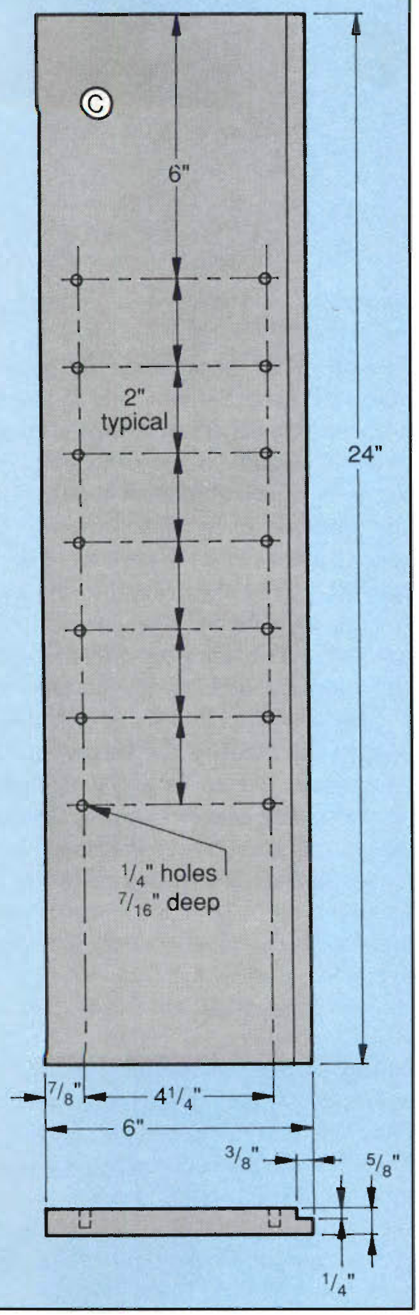
illustrations by Tom Larson

blade. Move the rip fence to the left side of the blade, and put the auxiliary fence on the side toward the blade. Set the blade to make a 45° cut. Set the fence so that the distance between the fence and the blade at the table surface is slightly more than $^1/_4$". Run a piece of scrap through to make sure your setup is right. Now, with the upper surface of the top against the fence, make the three cuts. Run the long edge first and then the two short ones. There is a small problem with the short sides on this cut: the piece is riding on a narrow edge and because of its short length, it can drop into the blade slot if it isn't supported. The easiest way to provide this support is to clamp a piece of scrap wood to the back side so that it will ride on the top of the rip fence. Cut the top bevel the same way but move the fence so that it's slightly more than $^5/_8$" away from where the blade enters the table.

The three edges on the bottom are slightly rounded. I do this with $^1/_2$" radius concave cutters in a moulding head on the table saw. My cutters are ground so that I have to make this cut with the rip fence on the left side of the cutter. Use the auxiliary fence, and set it so that only the curve of the cutter is exposed. Set the height so that it cuts to slightly less than half the thickness of the bottom. These cuts are made with the material laying flat on the table, and it will require two different settings because of the rabbet. (Be sure and test these setups before committing your part. If you cut too deep you won't have enough room left for the sides and doors before the curve starts.) This is as far as we go with these two parts for the moment.

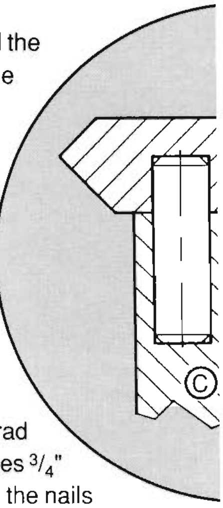
The sides (C) come next. It is with the sides that you get the chance to create a distinctive cabinet. You may not want to bother with this, but if you do, here is a suggestion. Look for a 2" thick piece, of suitable width and length, with a very distinctive grain pattern, such as the one in the picture. Resaw this piece down the middle, and joint smooth the resulting faces. These will be the outside faces of your sides. Now, leaving these faces alone, finish machining the sides as shown in Figure 2, including cutting the rabbet for the back and drilling the holes for the shelf supports.

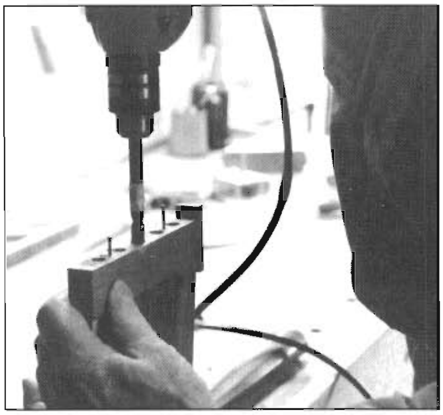
Figure 2. The Right Side



illustrations by Tom Larson

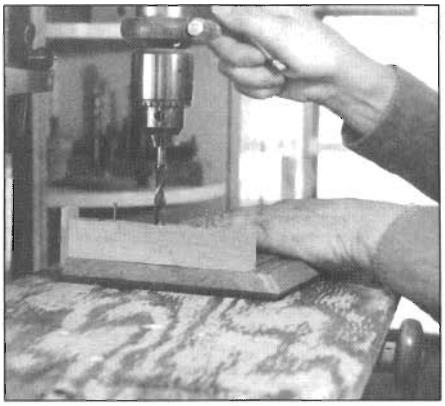
The four case members are joined together with a dowel joint as shown in the detail of Figure 3 at right. To get the necessary accuracy and proper positioning of the parts for this joint, it is best to construct the simple jig shown in Figure 4. Be sure to mark the jig as shown (with the reference surface for the horizontal members and the reference surface for the vertical members) so that you won't get confused when using it. The positioning of the jig on the pieces is very important. Mark the cabinet sides with chalk to indicate the inside face and the top and bottom edges. Place the jig on the top edge of one side with the stop against the back edge and the side of the jig flush with the *inside* face of the side. The edge of the jig marked "vertical" should be against the end of the material. Push two #6 finishing nails through the small holes and tap them far enough into the side to hold the jig firmly in place. Using a portable electric drill and a 3/8" brad point drill bit, drill all six holes 3/4" deep. Remove the jig, pull the nails completely out, push them in from the other side and position the jig on the matching face of the top. You want the stop against the back edge, and the same face that was flush to the inside of the side should be tight against the shoulder of the rabbet. Tap the nails home to hold the jig in place, and with your 3/8" drill bit in the drill press, drill all six holes 1/2" deep. Now do





The drilling jig's stop should always be referenced against the back edge, and the proper surface of the jig should be flush to the inside surface of the side.

To locate the dowel in the top and bottom, postition the stop against the back edge and the proper surface agianst the shoulder of the rabbet.



photos by the author

Hanging Showcase

Cutting List

		Rough Size			
Qty	**Part**	**T**	**W**	**L**	**Piece**
1	A	7/8"	7 1/4"	19"	top
1	B	7/8"	6 3/4"	18 1/4"	bottom
2	C	5/8"	6"	24"	sides
2	D	5/8"	1 1/2"	24"	outside stiles
2	E	5/8"	1"	24"	inside stiles
1	F	5/8"	1 1/2"	*18 1/4"	top rail
1	G	5/8"	1 5/8"	*18 1/4"	bottom rail
2	H	1/2"	1/2"	2 1/2"	handle blanks
1	I	3/8"	19"	25"	back panel
8	J	1/4"	3/4"	1 1/8"	shelf supports

Supplies

2 pr	1" X 1" brass cabinet hinges
2	1/4" bullet catches
2	cabinet hangers
	#1 X 3/8" brass round head screws
	#4 X 5/8" brass flat head screws
2	1/8" X 7" X 21 1/2" glass panels**
2	1/4" X 5 3/4" X 17 3/4" glass shelves**

*cut in half to make two rails w. continuous grain
**cut to fit

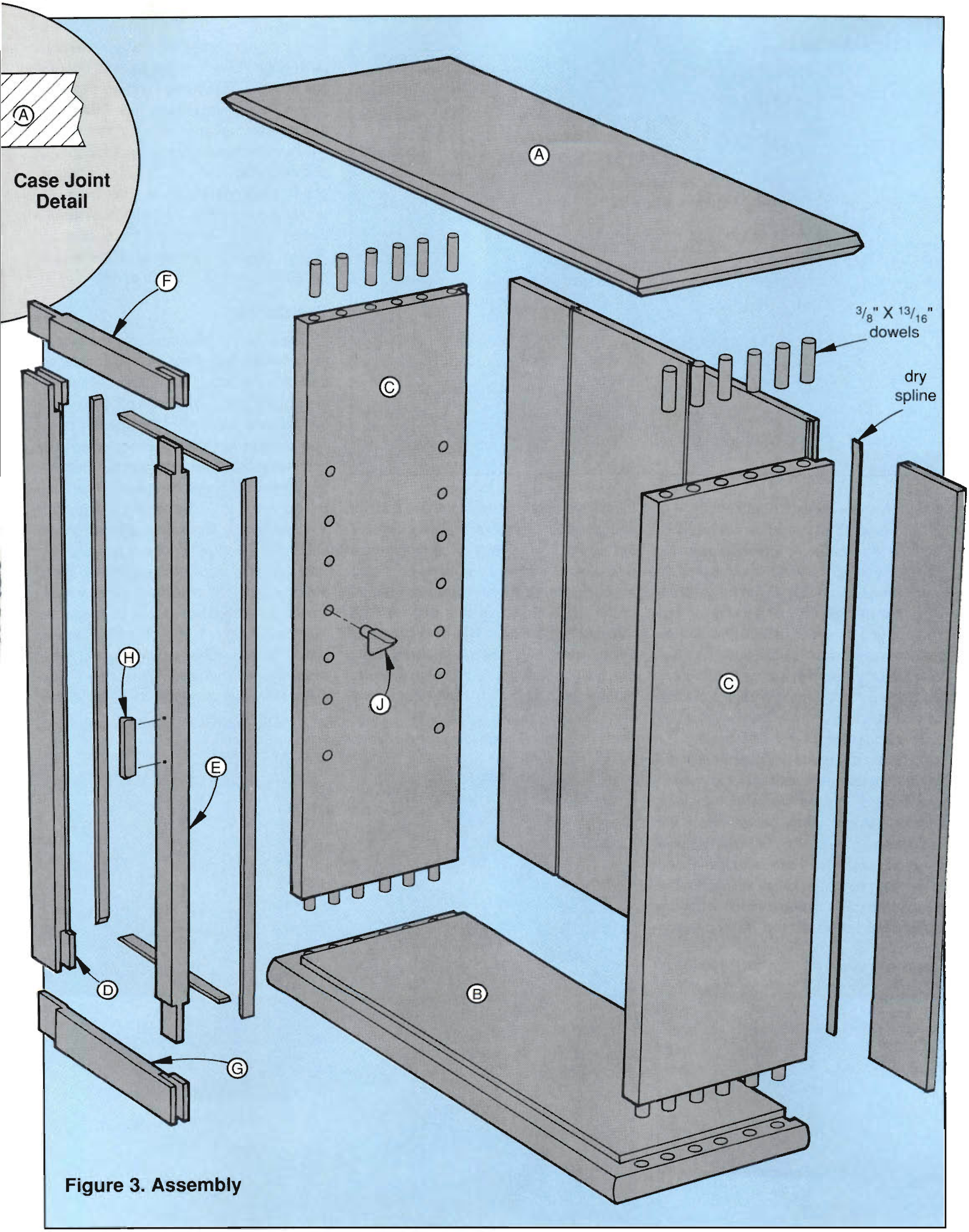


Figure 3. Assembly

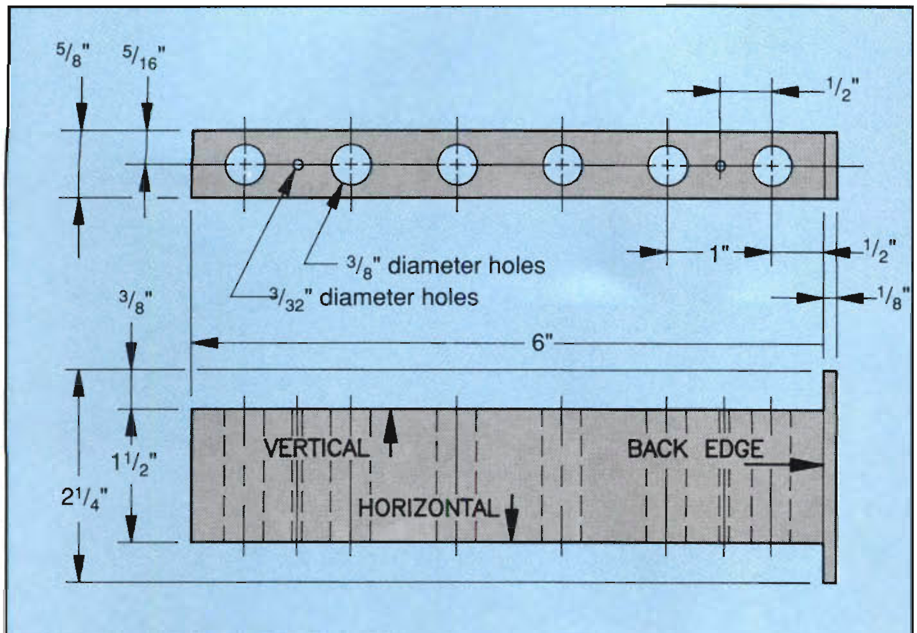


Figure 4. The Doweling Jig

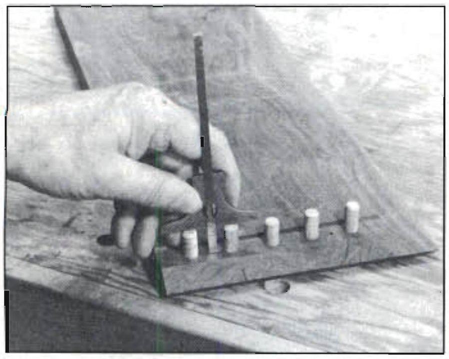
the other three joints the same way. It is very important that you follow this positioning procedure carefully. It also helps to drill each joint completely at the same time. In other words, don't drill all the holes in the sides and then go back and do the top and bottom; you may get confused and then the holes won't match. Cut 24 dowels 1$^3/_{16}$" long. Slightly taper each end and be sure to put a few grooves down the sides of each for glue to escape. The dowels should be a firm hand–push fit into their holes.

Now run through a dry assembly of the case, putting the dowels first into the top and bottom. Push them in until they hit bottom. Using a depth gauge, check the protruding amount of each dowel against the depth of the hole it is to go into. If one is too long trim the dowel. Assemble the sides to the top first, and then to the bottom to complete the assembly. Be sure everything fits properly and that the two parts of each joint go together completely. Square the case (if you can't square it, make adjustments until you can), and turning to the back, mark the limits of the back rabbet in the top and bottom that matches the rabbets in the sides. The dimensions of this rabbet are $^3/_8$" deep X $^1/_2$" wide. Take the case apart and cut these stopped rabbets with a router; then square the corners with a chisel. You can now glue the case together. Assemble it as you did dry, putting the dowels in the top and bottom first and making sure they bottom. Put glue only in the top third of the holes. Do not put any glue on the faces of the joints. When you have the dowels in the top and bottom, and before you put glue in the side holes, check the length again against the hole depth on each one and trim any dowel that's too long. Then finish the assembly. Square the case and clamp it that way if necessary, and set it aside to dry.

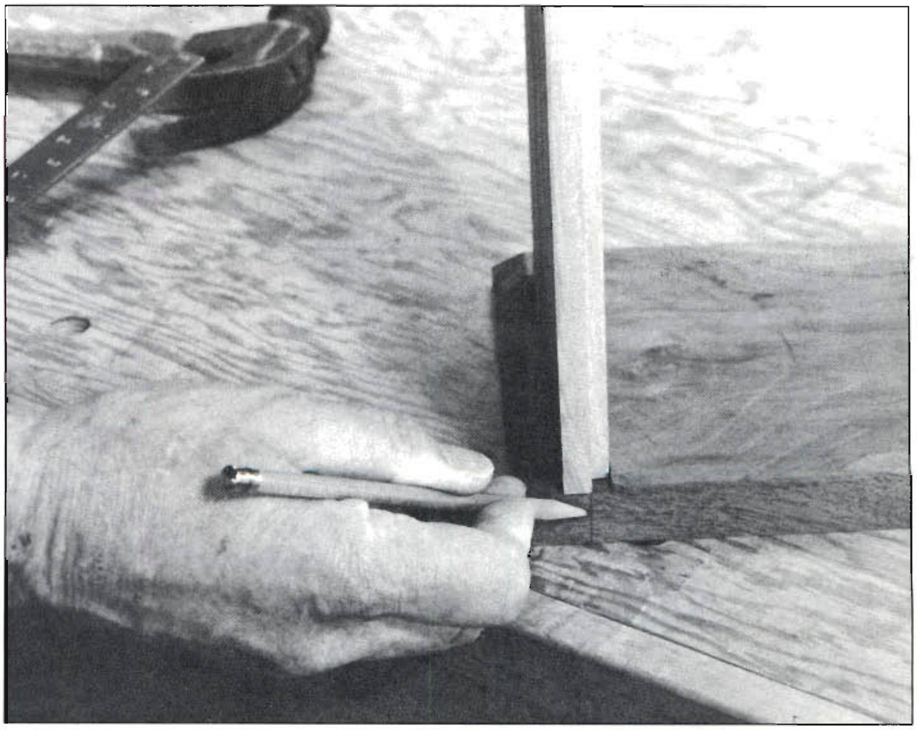
The Doors

The doors for this showcase are simple to construct but there are a couple of details to pay attention to. The first is that the outside stiles (D) extend past the rails, but the inner stiles (E) fit inside the rails. The second is that the inner stiles are somewhat narrower and thinner than all the other door frame members. The purpose of this is to tie the two doors together in appearance. This effect will be further enhanced if you will cut both top rails (F) from the same piece of wood so that when the doors are closed, the grain lines will be continuous across both doors. Do the same with the bottom rails (G). If you look at the picture of the finished cabinet you will see what I mean. When cutting the inner stiles, make them the same thickness as all the

Use a depth gauge to check that the dowels all protrude $^3/_4$" from the top and bottom.



During dry assembly, mark where to stop the rabbet in the top and bottom. Rout this rabbet and chisel the corners square to accept the back pieces.



photos by the author

other frame members. You will reduce them to their finished thickness only *after* all the mortise and tenon joints have been cut. Also notice that the bottom rails are wider than the top rails and the outside stiles. Study Figure 5 and 6 so that you will clearly understand what I'm talking about.

Cut all the door frame pieces to their finished widths and lengths, and cut an extra piece about 10" long to use as a test piece in making your mortise and tenon setups. Lay the pieces on the benchtop in their relative positions, and mark with chalk where the mortises go and where the tenons go. Cut the mortises first. Notice that they are through mortises (also known as "slip joints"). Set your dado head for 1/4" width of cut. The depth of the mortise at the top and bottom ends of the outer stiles is different, so be careful. The depth of the mortises on the inner ends of the top and bottom rails is the same, but different from those on the outer stiles (see Figure 5). Make these cuts in the exact center of the piece. You can make them using a tenoning jig or freehand against a high auxiliary rip fence, but make sure your throat plate fits snug around the blade.

To cut the tenons, make the shoulder cuts first, with the piece flat on the table, the saw blade set at 3/16" high and the rip fence set for the length of the tenon measured to the outside of the blade. Make the shoulder cuts for one of the tenon lengths on the test piece you made earlier. Now make the cheek cuts, and try the tenon in the mortise. If it's too tight or too loose, change your fence setting just a hair in the proper direction. You want to get a nice snug fit, but a too–tight fit tends to spread the sides of an open mortise and spoil the joint. Once you have the correct fit, go ahead and cut the cheeks on all the tenons. You'll have to adjust the blade height for the different tenon lengths.

Now put the frames together dry, and fit them to the case. The length of the doors should be about 1/16" shorter than the opening. As for the width, with the doors tight together, the outer edges should be flush with the outside face of the cabinet sides. At this point, machine the inner stiles to their proper thickness, which should be 9/16" finished. Take this cut from the front face of the pieces. You can now glue the frames together and check them for square. Remember, in gluing a mortise and tenon joint, always put the glue in the mortise, never on the tenon. Use the glue sparingly and put it in the first third of the opening so that the tenon will wipe it down over the rest of the joint when you put it together. This way you won't have a lot of excess glue to clean up. If some glue does squeeze out of the joint, don't try to wipe it up at this time. Wait until it dries and then clean it up with a sharp chisel.

illustrations by Tom Larson

When the glue has set, it's time to cut the 1/4" wide X 3/8" deep glass rabbet. This can be done with a router; I would use a cutter with a pin guide rather than a ball bearing guide because it will leave you with less work squaring up the rabbet. Next, turn the doors over and put a 1/8" radius on the outer edge of the outside stiles; then put a 1/16" radius on the inner edge of all frame members. The first can be done with a router or on the router table, but the latter is best done with a spoke shave and sandpaper.

Next, mill some stock for the glass mouldings. The cross–section dimensions of this moulding are 1/8" X 3/8", with one edge being completely rounded. Cut the pieces to length with mitered corners, and fit them to the opening. They will be held in place with #1 X 3/8" brass round head wood screws, which take a 7/64" shank hole. You can drill these now, four in the long pieces and two in the short ones. Please note that when the glass is in place, the moulding strip edges will be above the face of the door frame. This is as it should be.

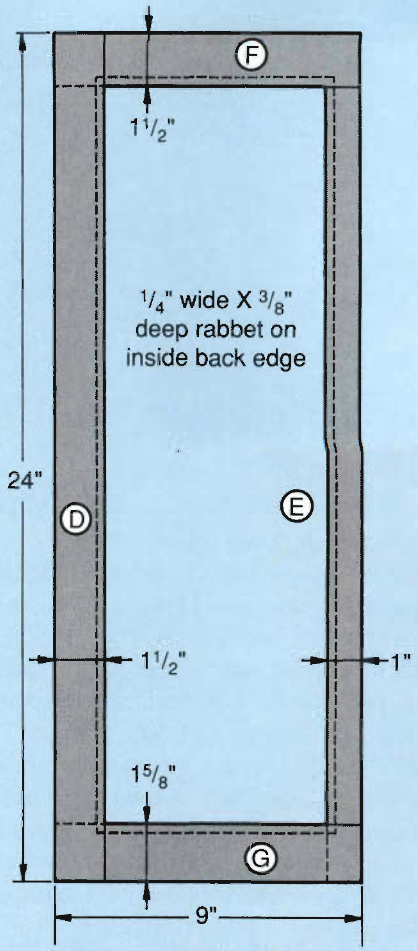
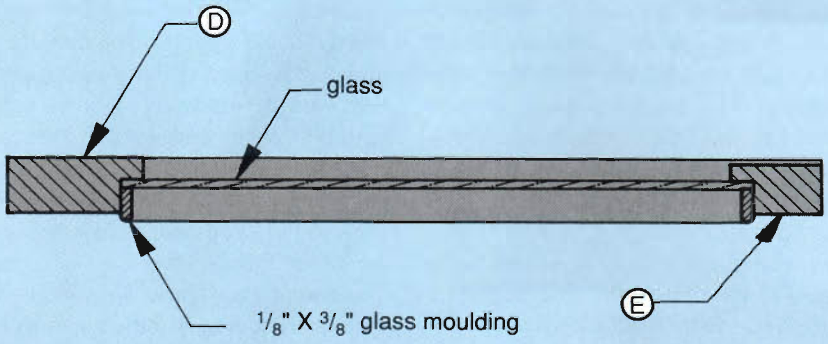


Figure 5. The Left Door

When it comes to glass, I have learned from experience to leave it to the experts. I take my doors to the glass shop and let them cut and fit the pieces. Get the thinnest glass you can for the doors. The shelves are 1/4" plate glass, with the edges finished. The dimensions for the shelves should be 1/16" shorter than the inside width and 1/16" narrower than the inside depth with the back in place. You can get the glass now, but don't install it until you have mounted the doors to the case. Mount the door frame on the case using 1" X 1" brass cabinet hinges. Mortise them into the inner face of the door and the front edge of the case side at about 1 1/2" from the top and bottom. The combined depth of the mortises should be equal to the thickness of the

Figure 6. Cross Section Through the Door



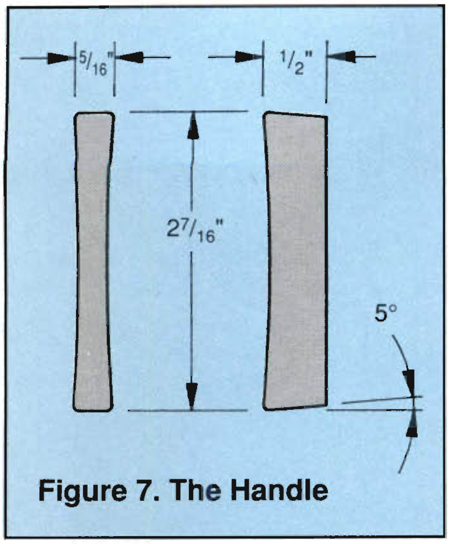


Figure 7. The Handle

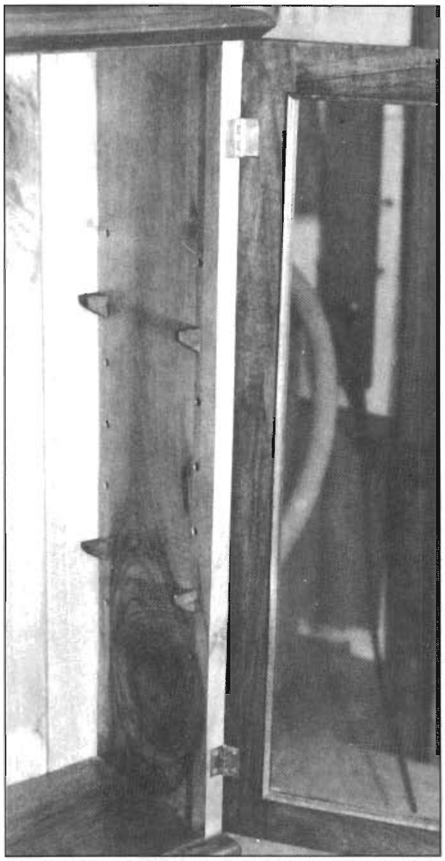
Illustrations by Tom Larson

closed hinge across the pin section. Mount each door separately. If the door is too tight against the case, place a paper shim under one leaf. If it's still too tight, shim the other leaf. If it's too far away, creating an unsightly gap between case and door, cut the mortises a bit deeper. You want the door to close smoothly and completely, but show little or no gap when closed. When both doors are mounted, you want to fit the mating edges. Bevel these two edges slightly toward the inside of the cabinet. If they still won't close, shave a little off one edge and then the other until they do. Ideally you want them to close with no daylight between them (notice I said *ideally*; mine don't).

Next, install $^1/_4$" bullet catches under each door. Mount them in the center of the frame about $^1/_2$" from the mating edge. Then attach the handles. The hand–carved stile shown in Figure 7 is the one I used. That doesn't mean you have to use it. Use anything that you feel enhances the showcase. It should be wood, but beyond that, let your imagination be your guide.

The Back

The back (I) is the easiest part of the whole project. It is made up of separate boards that are $^3/_8$" thick, fastened top and bottom with #4 X $^5/_8$" brass flat head wood screws and having a dry spline joint between the boards. Here again you should take time and care in choosing the wood. Remember, it will be seen through the glass doors, therefore it should have a distinctive grain pattern that enhances the beauty of the showcase. The number of pieces you use for the back will depend on the grain pattern you find. Mine was made up of four pieces, the two in the center with the pattern, and then two filler pieces on the sides.

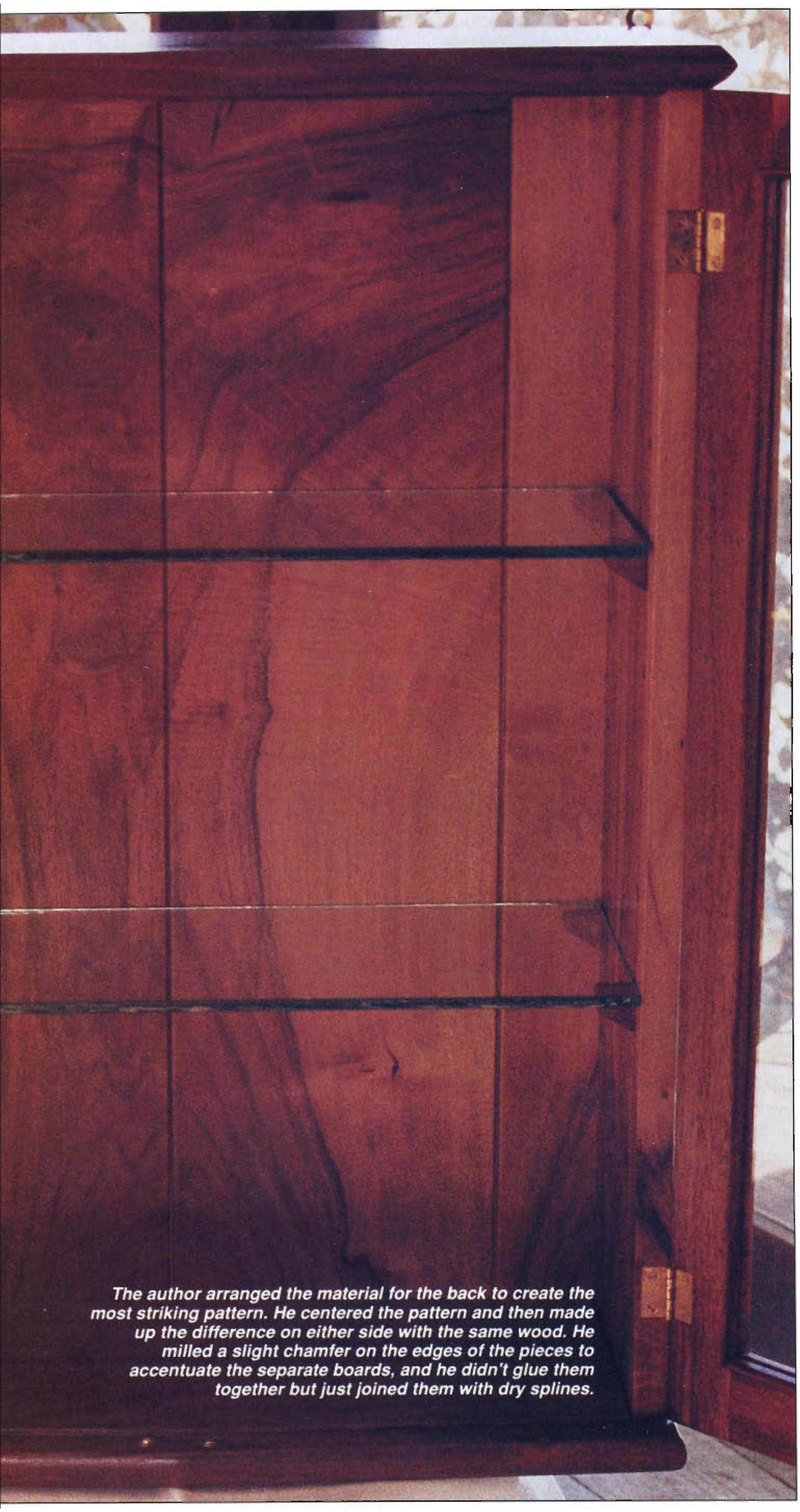


Mortise the hinges into the sides and the back of the outer stiles.

As I said previously, the individual boards are supported lengthwise with a dry spline joint. Cut a $^1/_8$" X $^1/_4$" deep groove in the center of each mating edge. The splines will be $^3/_{64}$" thick X $^7/_{16}$" wide and should slide easily in the grooves. Put one between each board, but don't use any glue. The edges of the boards that will be inside the cabinet should have a very slight chamfer. The purpose of this is to clearly indicate that they are separate boards and not supposed to be glued together.

The Shelf Supports

Since the shelves are glass, you will see the shelf supports. You can use ordinary metal supports that you can get at a hardware store but they will, in my opinion, detract from the looks of the showcase. I made wooden ones (J). They are not difficult to make and they make a great difference in the appearance. Figure 8 shows what they look like and their dimensions. You can use a contrasting wood to make them stand out or use the same wood so they will blend in. Cut them to shape on a



The author arranged the material for the back to create the most striking pattern. He centered the pattern and then made up the difference on either side with the same wood. He milled a slight chamfer on the edges of the pieces to accentuate the separate boards, and he didn't glue them together but just joined them with dry splines.

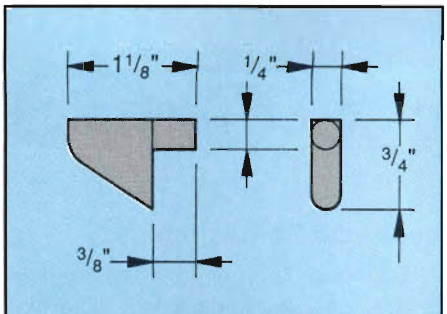
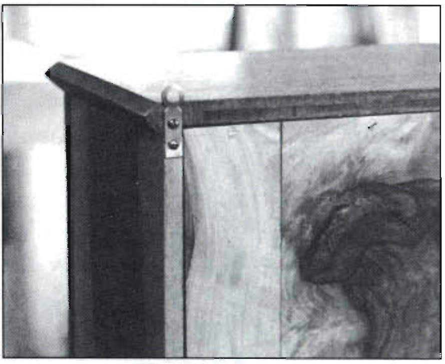


Figure 8. The Shelf Supports



photos by the author

Posititon the cabinet hangers so the weight is supported, rather than just hanging from the top.

band or jigsaw, round the pin and the slanting edge with a knife; then fit the pin to the holes in the case side. It should be a nice snug fit, but not tight. Finish sand everything but the pin.

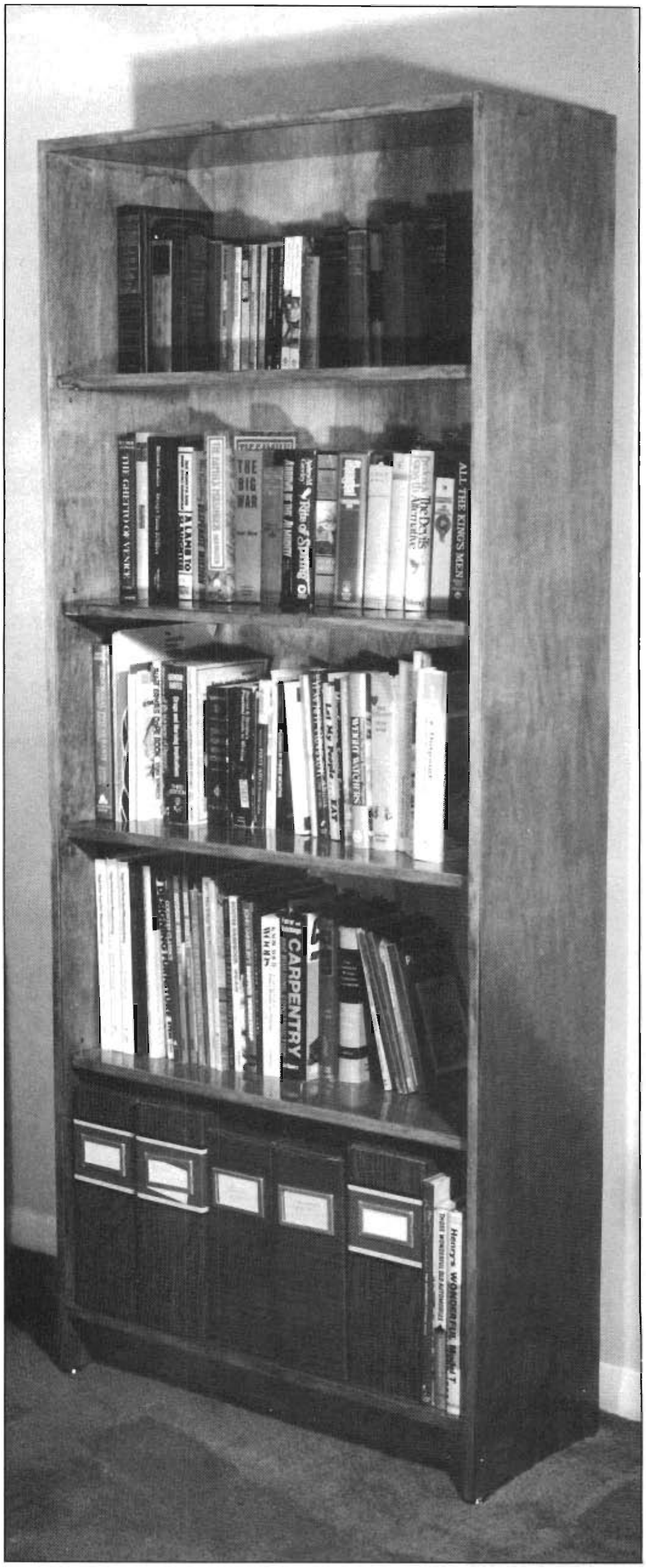
For the finish, I used Formby's Tung Oil Finish. It's a little expensive, but I like the results. I apply it a bit differently than the instructions suggest. I use three coats plus, depending on the density of the wood. I brush on the first two coats and let them soak in and dry, buffing with #000 steel wool after each coat. The remaining coats are brushed on, left for about five minutes and then the excess is wiped off with paper towels. Use the steel wool after each coat except the last. Add coats until you get the gloss you want.

The way this showcase is hung is very important. Because of the dowel joint between the sides and top, *it should not be hung from the top.* It should be hung with brass hangers such as those shown in the photo above, placed with one screw in the top and one screw in the side. When hung this way, there will never be any danger of the joint failing and the case falling.

That about does it. When you've finished this project you'll have a showcase in which you'll be proud to display your treasures. **PW**

A Good Basic Bookcase

by Jacob Schulzinger



photos by the author

Sooner or later, every woodworker is asked to build a good basic bookcase. Here's a design that makes the most of a single sheet of 3/4" plywood and has adjustable shelves to accommodate books of different sizes.

When I work with plywood, I like to start by rough–cutting a sheet into several smaller pieces using a portable circular saw. The first order of business is to make a scale layout of a standard 4 X 8 plywood sheet on paper and identify exactly where each piece will come from. Once that is done it is safe to make the initial cuts that will break the sheet down into pieces that are more manageable. As shown in Figure 1, the first cut splits the sheet into two equal segments, the second brings the portion allocated for the sides of the case to length, while the third cut works the segment for the shelves down to handier sizes. Handling the sheet for these operations is made easier if the sheet is laid on some 2 X 4's that are carefully positioned on the floor as shown in Figure 2. I set the work up this way and then crawl over it, with saw in hand, for the safest handling. This setup provides proper support of both the full sheet and the portions to be cut, and keeps me from trying to stretch my arm out beyond a safe distance.

Now that the major breakdown cuts have been made, it is possible to handle the remaining pieces on a table saw. Rip all of the pieces to 11 3/4" even though some of the boards will ultimately be narrower than others. This will speed up the initial processing of the large sections of board by quickly breaking them down into handier, more universal sizes. Because plywood has a tendency to splinter when being cut, I always use masking tape on the surface where the blade will exit the material. When using a portable circular saw, tape the top surface; on a table saw, tape the bottom. As soon as the cuts are made, pull the tape off towards the cut edge to minimize the chance of tearing any fibers free.

Set aside the shelving material for the time being, and move directly to the sides (A) as these pieces require the most work. Place the two boards alongside each other with the intended back edges butting against each other and with the inside surfaces facing up. This gives an immediate frame of reference for the correct placement of the dadoes. With a sharp pencil, layout the positions of all of the dadoes as shown in Figure 3. Then take a test cut with your 3/4" straight router bit in a piece of scrap material to check the width of the dado against the actual thickness of the plywood. This is a critical step and should not be ignored. I found out just how critical when I made my test cut and learned that the plywood was a strong 1/32" thinner than expected. I had to resort to making multiple passes with a 1/2" diameter router bit.

To speed up my routing operation, I made a simple spacer that is as wide as the distance from the edge of the cutter to the edge of the router base. I position this spacer along my layout line for the top edge of the dado and then clamp a straightedge on the

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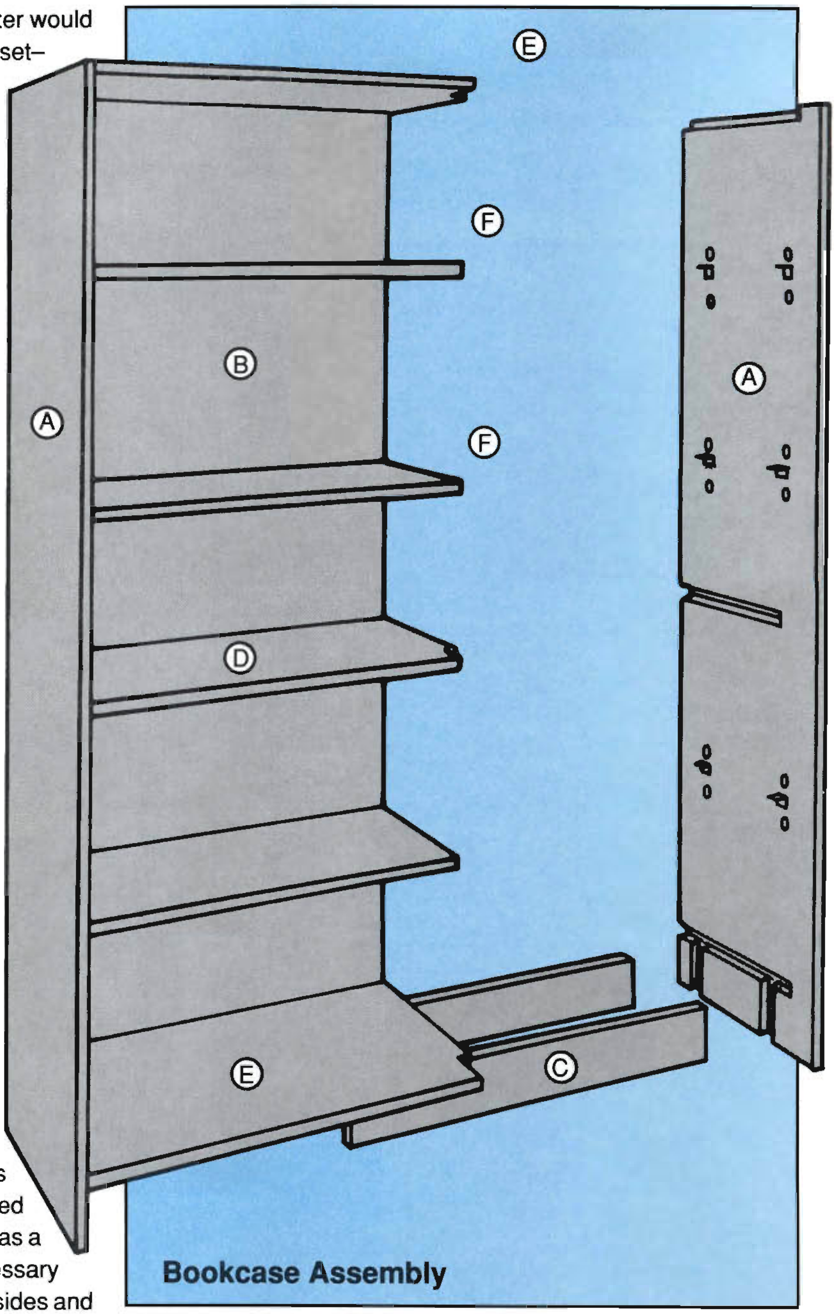
***Jacob Schulzinger** is an industrial engineer in the aerospace industry. Woodworking is his part–time business and hobby.*

other side of the spacer. Since two passes with the router would be needed to get the desired dado width, I also made a set-over block that would space the router bit the exact distance needed. By placing this block against the clamped straightedge, I was able to accurately make the second cut to finish the dado. I used a plunge router to cut the $^{3}/_{8}$" deep dadoes in a total of three safe passes. Don't forget to rout the slots for the bottom shelf supports (C) as shown in Figure 3.

Next, rout the rabbet along the rear edges of the sides to accept the $^{1}/_{4}$" plywood back (B) for the unit. At this point all of the router work on the sides has been completed; use a sharp chisel to square out the rounded corners.

To drill the holes for the moveable shelf pins, I made simple marking templates from $^{1}/_{4}$" plywood, fitted into a slotted board which acts as the edge reference. Mark a line 2" away from the edge reference; then mark 11$^{3}/_{8}$", 12$^{3}/_{8}$" and 13$^{3}/_{8}$" from the bottom of the template and drill $^{1}/_{8}$" holes at these points (see Figure 4). Make another template with holes at 13$^{5}/_{8}$", 14$^{5}/_{8}$" and 15$^{5}/_{8}$". To use the templates, position the stop against one edge and the bottom of the template against a piece of stock inserted in the dado as shown in the photo on page 83. With a $^{1}/_{8}$" bit chucked in your drill, spot mark the three holes; then flip the template over and reference it against the other edge. Reference the first template against scrap in the center dado; then flip it end-for-end and reference it against scrap in the top rabbet. Reference the second template against scrap in the bottom dado. This will allow for tall books at the bottom of the bookcase with the rest of the shelves at about 12" apart.

Plywood, unlike solid wood, needs special edge treatment. Since I used maple plywood for this project, I ripped some $^{1}/_{4}$" thick maple strips from a board to serve as the edges. (See the sidebar on page 83 for a good method of ripping these strips.) I applied the strips to the forward edges of the sides with glue and clamped them in place until dry. Because the solid maple stock was a bit wider than the thickness of the plywood, it was necessary to trim it with a plane. Cut the strips a bit longer than the sides and



Bookcase Assembly

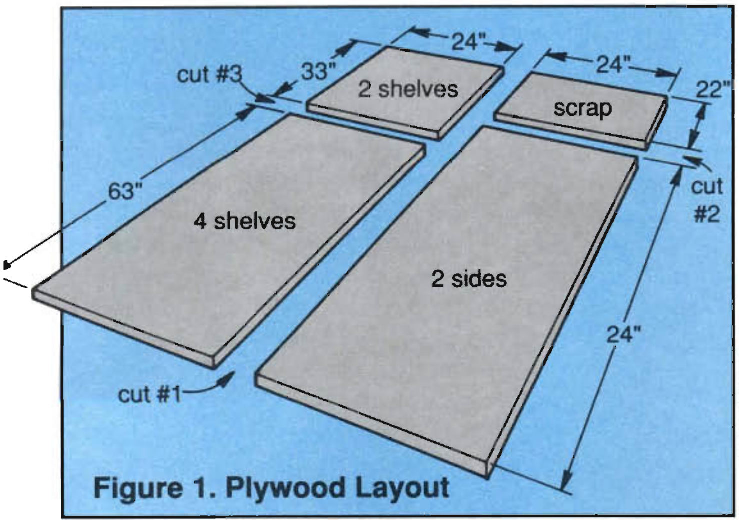


Figure 1. Plywood Layout

Illustrations by Robert Chapla

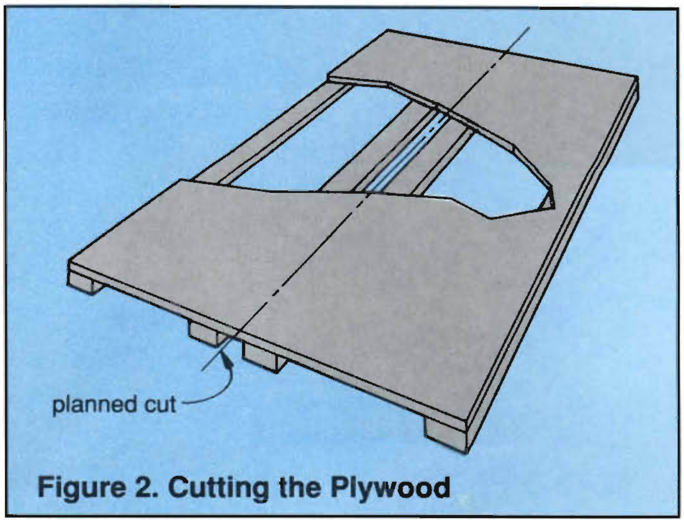


Figure 2. Cutting the Plywood

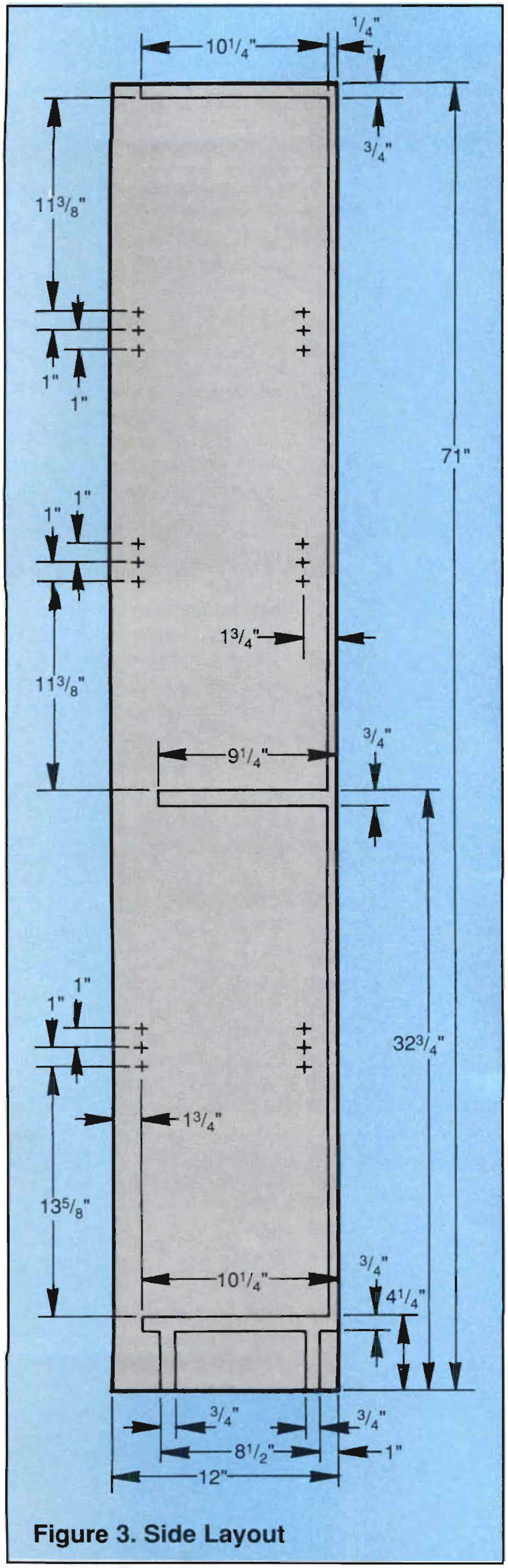


Figure 3. Side Layout

illustrations by Robert Chapla

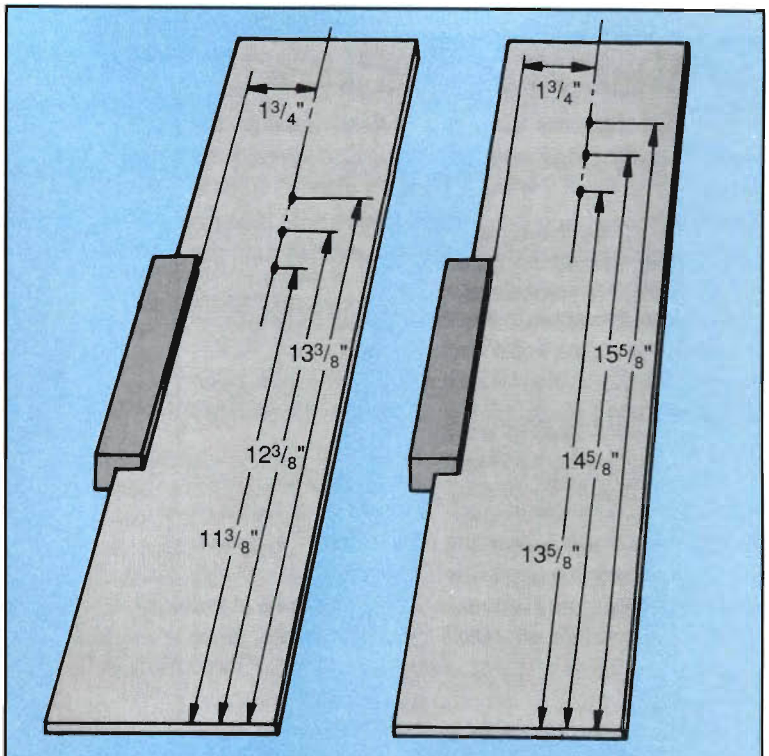


Figure 4. Shelf Hole Templates

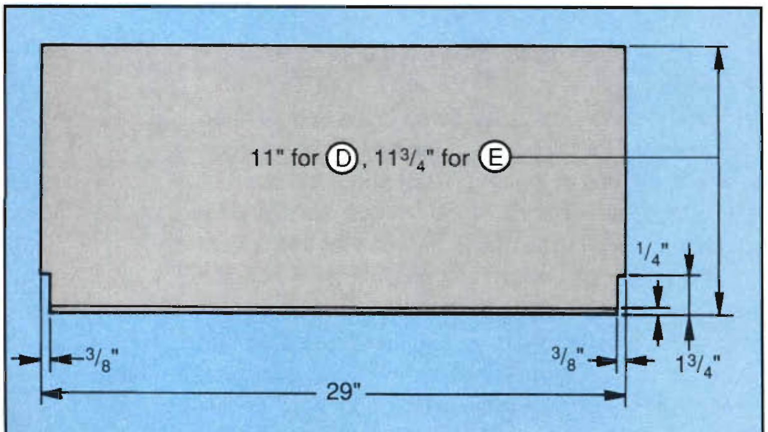
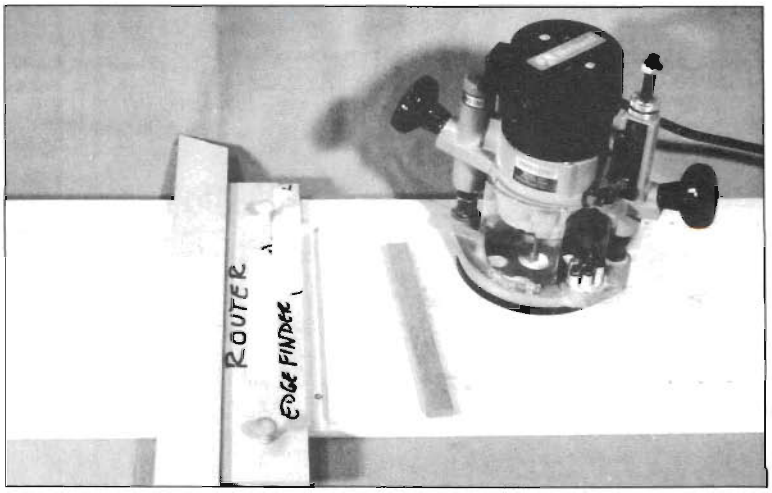


Figure 5. The Fixed Shelves

An edge finder and set–over block make routing easier and more accurate.



photos by the author

A Basic Bookcase					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	$^{3}/_{4}$"	*12"	71"	sides
1	B	$^{1}/_{4}$"	29"	67$^{1}/_{2}$"	back
2	C	$^{3}/_{4}$"	3$^{1}/_{2}$"	29"	bottom shelf supports
1	D	$^{3}/_{4}$"	*11"	29"	center shelf
2	E	$^{3}/_{4}$"	*11$^{3}/_{4}$"	29"	top & bottom shelves
3	F	$^{3}/_{4}$"	**10$^{3}/_{4}$"	28$^{1}/_{16}$"	adjustable shelves
Supplies					
12	adjustable shelf pins				
4	furniture glides				
	1" wire brads				

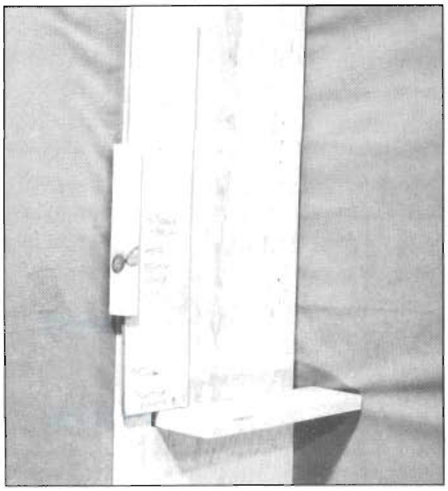
*includes $^{1}/_{4}$" strip applied to front edge

**includes $^{1}/_{4}$" strips applied to front & back edges

trim them to length with a fine–toothed hand saw.

With all of the work completed on the sides, it is time to move on to the shelves. Rip the center shelf (D) and the top and bottom shelves (E) to finished width making sure that you allow for the $^{1}/_{4}$" strips that will be glued to their front edges. Glue the strips to the front edges of all of the fixed shelves and allow the glue to cure. Then cut the boards to length, and layout and cut the notches to fit the stopped dadoes as shown in Figure 5.

The bottom shelf supports (C) are made from solid stock and should be the same length as the fixed shelves. When installing these supports it is not necessary to glue them to the shelf itself, only glue them in the slots.

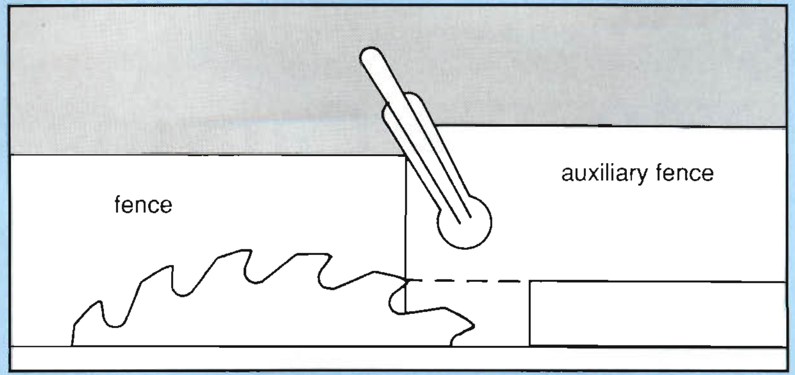


The pilot drilling template simplifies the problem of laying out and drilling the holes.

Now cut the back of the bookcase (B) to final size. It is not necessary to finish sand it at this time, as it will only be used to keep the carcase square during assembly. Finish sand all of the parts that make up the carcase and glue them together.

While the carcase is drying, make the rest of the shelves (F). Rip the boards to their final width making sure that you make allowance for the two $^{1}/_{4}$" thick trim pieces that will be glued to the front and back edges. Attach the trim strips and then cut the boards to length. Make sure that the final length of the boards takes into account the thickness of the L portions of the adjustable shelf pins. When the shelves have been completed, they—as well as the plywood back—should be finish sanded.

I finished this piece with one coat of sander sealer followed by two coats of varnish stain, sanding with #0000 steel wool between each coat. I applied the finish before installing the cabinet back for ease of working. Attach the back with some 1" wire brads, apply a coat of paste wax, attach furniture glides to the bottom of the sides, and the unit is ready for use. PW



Making Edging Strips

by Link Lincoln

What's the best way to safely make thin strips of solid wood to cover plywood edges? You could reset your table saw after every pass to make the offcut piece the desired thickness, but that's time consuming and not dependably accurate. What I do is attach an auxiliary piece of wood to the normal rip fence that ends at the point where the blade makes a full cut. This short fence allows the material to fall free of the blade as soon as it's cut, without having to be pushed all the way through. It's safe, and you don't have to worry about the back of the blade damaging the strip. A sharp hollow–ground blade works best for this.

To remove saw marks, lay several of the strips side by side on a bench. Place a board across the end of the strips, clamp it down and sand them lightly with a finishing sander. Reverse the strips to sand the other ends.

I use contact cement to attach them to the plywood. I prefer the kind of contact cement that doesn't contain the solvent *toluene*; toluene works best, but if you don't have proper ventilation you may end up applying the strips crossways. Spread cement on both surfaces and allow it to dry completely. Carefully align the strip to the plywood at one end while holding the rest away from the plywood edge (once the cement grabs, it won't let go). Lay the strip in place and burnish it down with a small wallpaper roller or similar tool.

A sander will finish the edge to the plywood. Round or chamfer the corners to prevent them catching on something and pulling loose. PW

***Link Lincoln** is a retired vocational teacher in Folsom, California.*

Five Relief Carving Projects

by William H. McMaster

When I teach woodcarving, I start new students with a relief carving project since it provides the best conditions for learning how to use carving tools and how to visualize in three dimensions. The ability to visualize does not come naturally to most people and must be developed through training and practice. The carvings presented here are of realistic subjects so they also provide an introduction to anatomy and proportions. Any carver interested in doing naturalistic art should start collecting photographs of the animals he is interested in carving. You may not be using the same pose, but the pictures will give you an idea of the anatomical surface features and the poses each animal can assume.

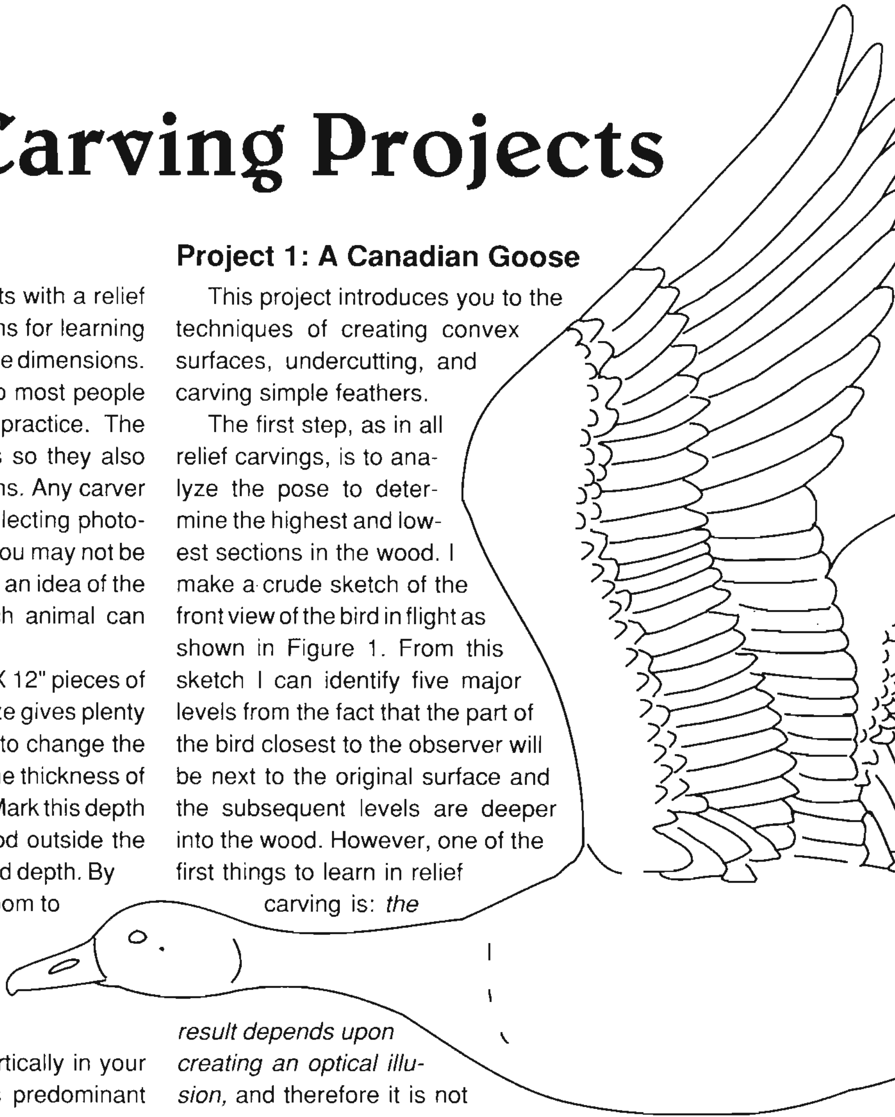
I have my students carve these projects in 10" X 12" pieces of Honduras mahogany about one inch thick. This size gives plenty of extra area to add your own embellishments or to change the size to the proportions you desire. To fully utilize the thickness of the wood, the carvings should be about ${}^{5}/_{8}$" deep. Mark this depth on all four edges and remove all the excess wood outside the pattern area down to about 1mm above this finished depth. By not going to the full depth at this time, you allow room to clean up errors and any compressions that result from outlining or other gougings. You'll remove these in the final stages when you are finishing the background surface.

It is usually best to have the grain running vertically in your carving. An obvious exception is when there is predominant horizontal motion as in the first project of the Canadian goose. In this case a horizontal grain enhances the illusion of motion.

These carvings require only a few tools; my students start with what I consider a minimum set of five: a ${}^{3}/_{8}$" double bevel skew, ${}^{1}/_{4}$" and ${}^{5}/_{8}$" #3 shallow gouges, a ${}^{3}/_{8}$" #9 deep gouge, and a 5/16" V-tool. For carving details this list is usually supplemented later by a smaller skew and a smaller #3 gouge, each mounted in a ${}^{5}/_{8}$" dowel rod. These smaller tools can be held like a pencil and I find that they give more control in detail carving than the standard gouges.

These projects are presented in order of difficulty, each introducing a new level of complexity, and are the most popular of the ones that I use in my beginning woodcarving classes. Full-size patterns for these five projects can be found in the PullOut™ Plans section in the center of the magazine. For more in-depth information on the principles and practices of relief carving in general, including discussions of mechanical drawing techniques for foreshortening, see my columns in Issues 39, 40, 41, 42, 45, 52, 53, and 54 of *Popular Woodworking* (see page 21 for Back Issue ordering information).

***William H. McMaster** is Chief of the Education Division of the California Carvers' Guild. His "Focus on Carving" is a regular feature in* Popular Woodworking.

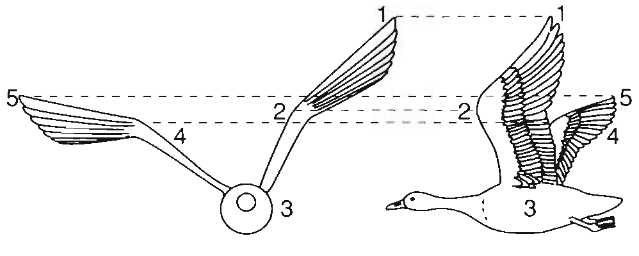


Project 1: A Canadian Goose

This project introduces you to the techniques of creating convex surfaces, undercutting, and carving simple feathers.

The first step, as in all relief carvings, is to analyze the pose to determine the highest and lowest sections in the wood. I make a crude sketch of the front view of the bird in flight as shown in Figure 1. From this sketch I can identify five major levels from the fact that the part of the bird closest to the observer will be next to the original surface and the subsequent levels are deeper into the wood. However, one of the first things to learn in relief carving is: *the result depends upon creating an optical illusion,* and therefore it is not always necessary to put things at the depth level you might expect. In this case, you can still create the proper illusion of reality by moving the goose's body forward in the wood. This changes the slope of the lower half of the left wing, but when viewed in the carving it will look right. By making this technical change you benefit by having more wood in which to carve the body and develop the right wing. Mark these levels on the pattern to help guide the initial roughing out. Now boast out the wood to establish these levels with the lowest level (5) being only about 2mm above the relieved background. Note that each wing has a change of slope at the origin of the primary flight

Figure 1. Establishing the Levels

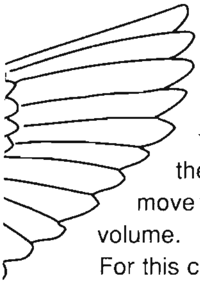


feathers (points 2 and 4). When you carve out your levels, this change of slope must be represented. These levels, as they should be carved, are shown in profile on the Pattern.

When carving the feathers, remember that the underside of the left wing and the top of the right wing is seen. This means that the feather overlap will be different for each wing and they should be carved as shown by the cross section view in Figure 2. The anatomical fact to note is that there are ten primary flight feathers. Once the feathers have been carved, you can greatly undercut the left wing so that it stands out and casts a deep shadow.

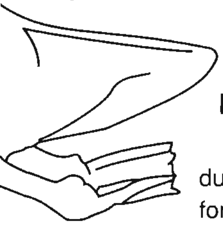
The body should be slightly undercut all around so that it also appears to stand out from the background.

Project 2: A Landing Duck



This project adds some complexity since the duck is not flying perpendicular to our line of sight but is approaching us at a shallow angle. Thus a slightly different technique must be used in shaping the body. The same analysis of the wings made for the first project also applies to this one, and again you move the body forward somewhat to provide more carving volume.

For this carving you must analyze the shape of the body as shown by the dotted lines in Figure 3. Establish line **A** to represent the highest contour of the body. Then locate line **B** which represents the bottom of the body. The body curves back from these lines into an undercut. Line **C** locates the top of the head and beak. Round the body and head using these lines for guidance. The left foot stands high and should be severely undercut, but leave a small ridge underneath for support.



Project 3: An African Elephant

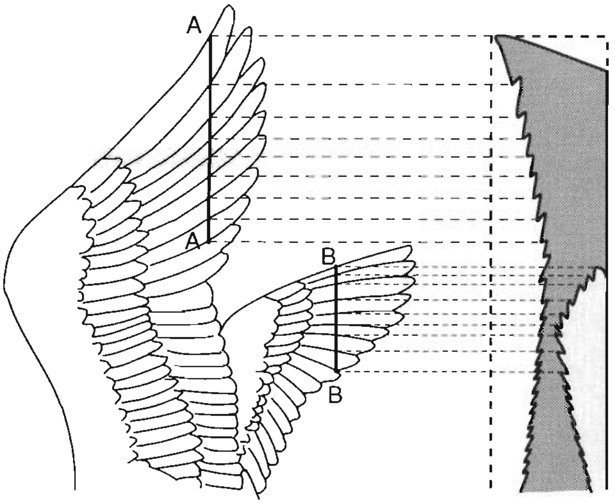
This frontal view of an African elephant introduces the carver to some additional problems of foreshortening since the major dimension must be severely compressed and yet the trunk and tusks must appear to stand out in front. To figure out the levels for this carving you must know something about the side view profile of the elephant's head. A sketch of this is shown in Figure 4 on the following page. Note the slight change of curvature in the forehead at A; this must also appear on your carving. Another anatomical feature to note is that the tusks line up with the eyes from both the front and side views.

Note that there are many prominent anatomical features associated with the elephant's head. The more you indicate these, the more effective your carving will be. The zygomatic arch at **B** is very prominent as well as the depression, **C**, above the eye. Also put in the change of curvature downward at the lower part of the ears at **D**.

Project 4: A White Tail Deer

This pattern presents an even more complicated pose with the head and body pointing in different directions. This requires a little more knowledge of foreshortening and a more effective use of undercutting than the previous carvings.

Figure 2. Feather Levels and Undercutting



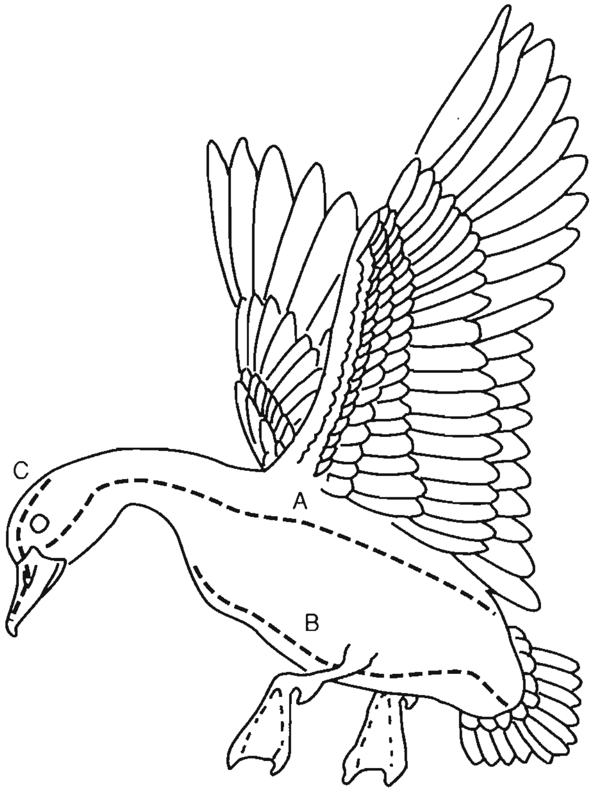
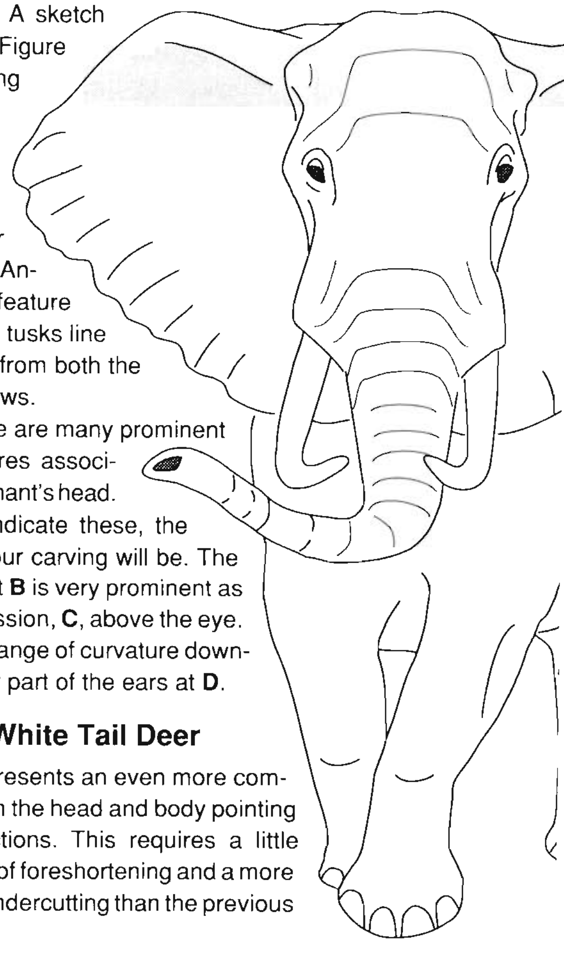


Figure 3. Body Contours

illustrations by the author



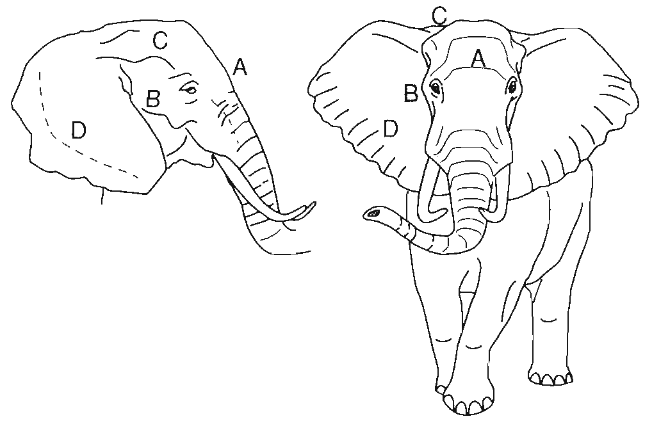


Figure 4. Levels for the Elephant

Illustrations by the author

To arrive at the foreshortening you must again know something about the proportions of the body. The size and shape relationships for the head and body are drawn in proportion in Figure 5. The body and head were angled to match the orientation of the pattern. Once this is done, you need to sketch in the antlers so you will know their depth relationships. Since this is a white tail deer, the antlers point forward.

Once you have constructed the pose from the top view, you can then determine the levels and map out the foreshortening. Two foreshortened cross sections of the body as seen from below are given on the Pattern. The antlers are numbered so that you can see their relationships as to the depth in the wood. Treat each side separately as you determine how deep to carve them, remembering that the optical illusion is the over-riding consideration.

Proper undercutting can enhance the figure of the deer. That part which is further forward should have deeper undercuts. In fact, the rear haunch and back legs do not need undercutting at all. Just make their profile perpendicular to the bottom surface.

The deer is standing on the ground so this must be carved so that the legs appear natural in relationship to this ground level.

Project 5: An Indian and His Horse

This is the hardest project of the group because it involves the familiar faces of both a horse and an Indian. Any gross errors in their features will be recognized immediately by the viewer. The figures are shown in profile to reduce the problems of foreshortening so that you can concentrate on the features. The main anatomical lesson to learn here is the relative size of the two heads. Each breed of horse varies slightly, but the relationship between horse and human is in the neighborhood of slightly less than three to one.

You will find that the main problem to be solved in this carving is how to create the illusion of the correct set of the eyes of both figures. But first, as always, establish the highs and lows of the carving. Since the horse's neck is a low region, you can carve the Indian's head only slightly deeper than the level of the horse. The extra wood above the level of the Indian's head is needed for shaping his war bonnet.

After removing all the background wood outside the pattern, the first step is to boast out the area between the two heads. Next,

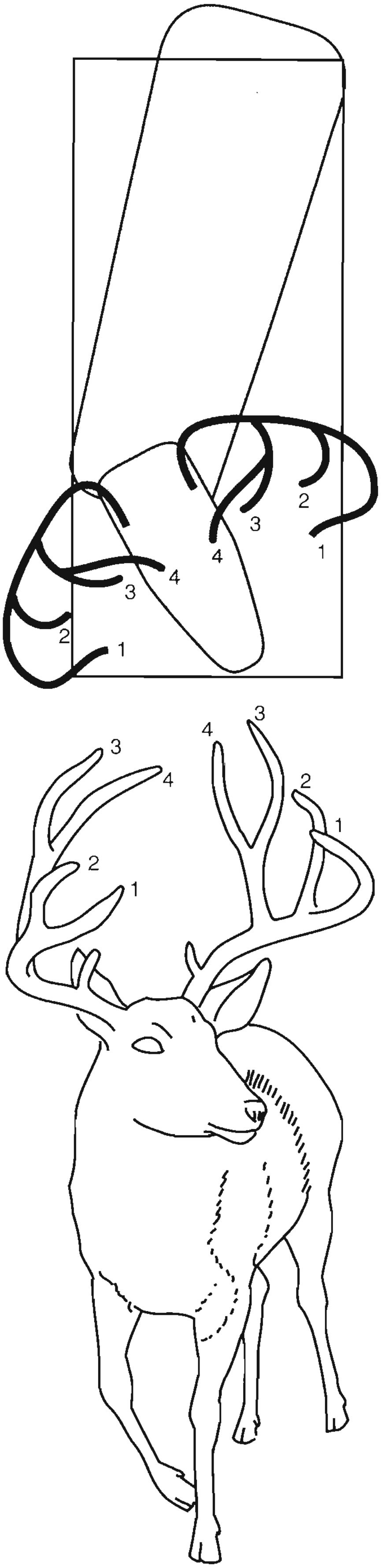
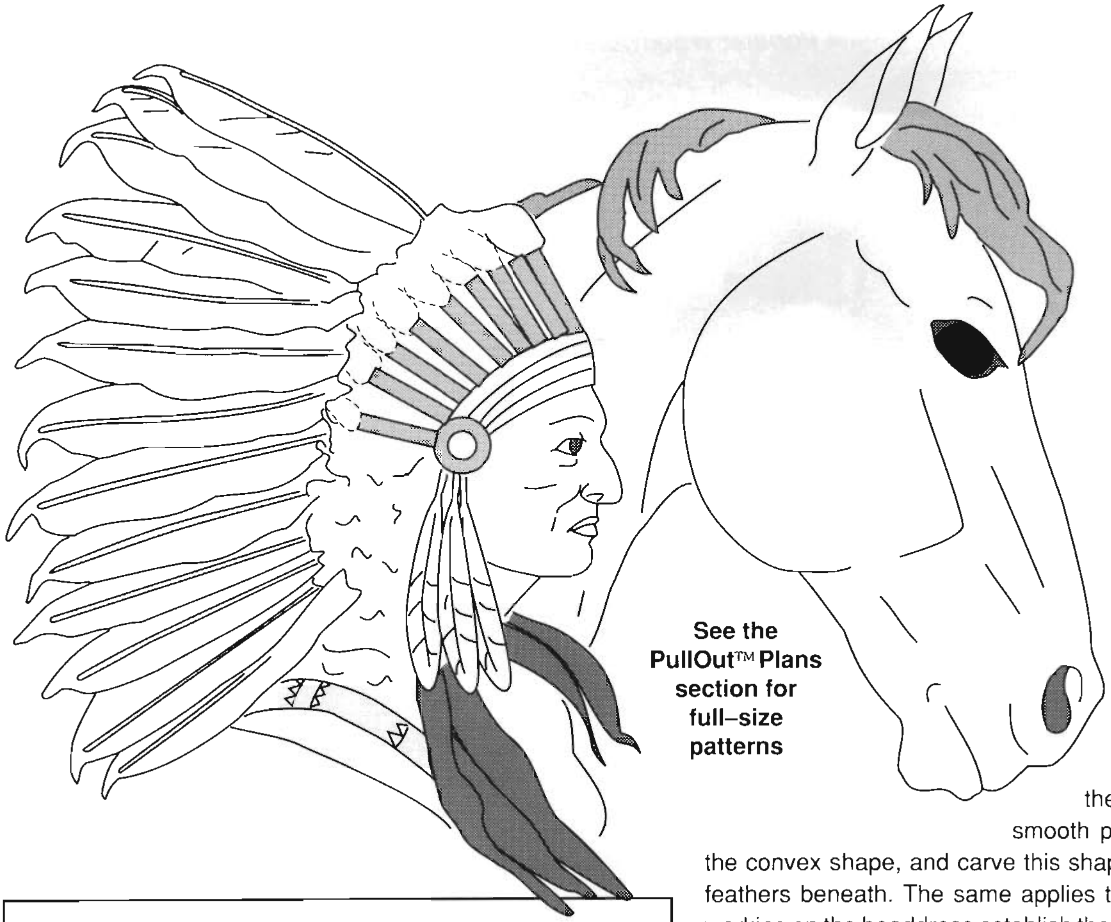


Figure 5. Foreshortening the Deer



See the PullOut™ Plans section for full–size patterns

form the surface area for the feathers of the war bonnet. Imagine that the surface is covered with smooth plastic which only shows the convex shape, and carve this shape—forget that there are feathers beneath. The same applies to the head piece. While working on the headdress establish the level of the Indian's face.

The tips of the feathers are very delicate, so don't carve any of the indentations until after all the shaping and layering of the feathers has been done. Then carve the indentations and do the undercutting to make them stand out. In this carving you should put more details on the feathers than you did for the bird carvings. Put some splits in the feathers to make them more realistic; however, never use regular spacing. They do not occur that way in nature.

As I mentioned, the carving of the eyes is the major problem for this project. The set of the two eyes in real life is quite different. Human eyes have a large region of stereoscopic vision which requires a forward set whereas the horse has more peripheral vision and his eyes are more on the side. As a result, human eyes have about a 15° set back from forward while that of the horse is near 45°. In a relief carving these must be compressed because of the limited depth of the wood, so it is best to establish the plane of the set first. This establishes planes that are in front of the eye, and once they are formed, the eye can be carved below this surface. The method for doing this is shown in Figure 6 where I have placed a box over each eye showing the region where these planes are to be carved. For the Indian, carve a single plane to the front of the eye and then drop a perpendicular to the face. For the horse carve two angled planes. These are illustrated in the Figure by the two cross sections at AA and BB showing the slopes of the planes in **1** and the subsequent shape of the eyeball in **2**. The depth of the cross section has been increased in the Figure so that you can clearly see the different forms being created.

These projects are not simple, but they are meaningful; and if you carve them, you will learn many of the techniques for successful carving in relief. PW

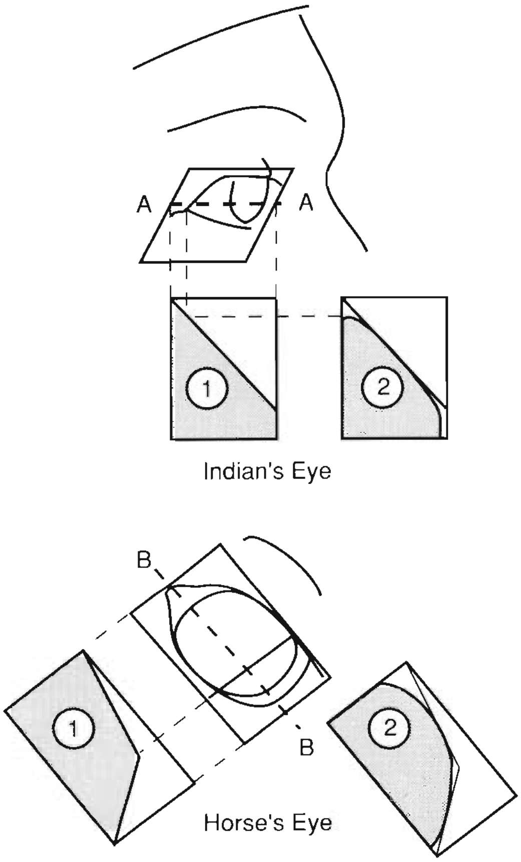
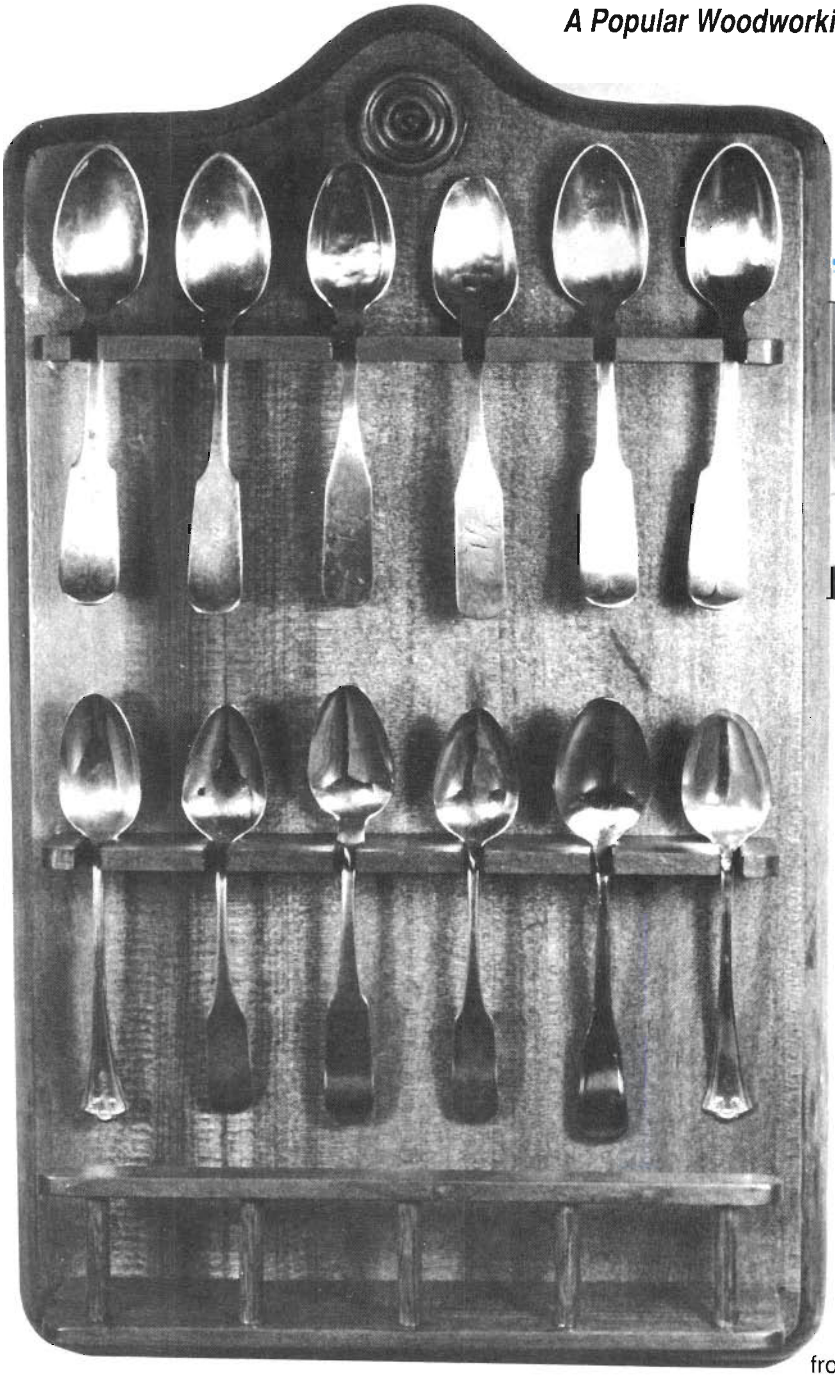


Figure 6. Establishing the Eye Set

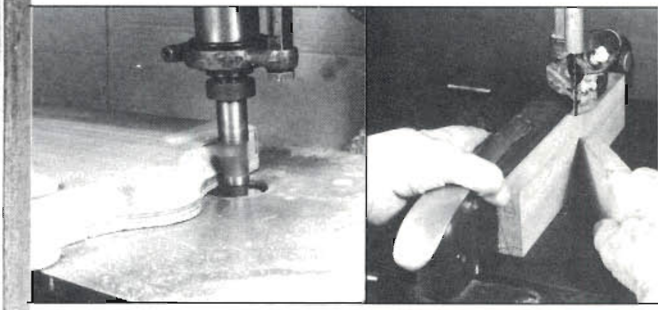
Antique



by Ralph Thacher

If your wife has a collection of old spoons or silver utensils tucked away, don't show her this article unless you're ready to go to work on it right away. The dimensions given here result in enough space to display a dozen spoons effectively.

After cutting the base piece (A) to 11" X 18", cut another to the same dimensions from scrap. Anything solid will do; you'll use this as a "slave" against which the router bit guide can run as you shape the edge of the base. If you use plywood, make sure the edges are solid; fill any holidays with plastic wood. Attach the slave board to the back side of the base with half a dozen small brads. Across the slave board's back side, scribe the centerline lengthwise and the centerlines across for the three shelves. In the PullOut™ Plans section of the magazine, you'll find a full-size pattern for the curved top section; transfer it to the slave board, saw out the shape, and sand the edges smooth.



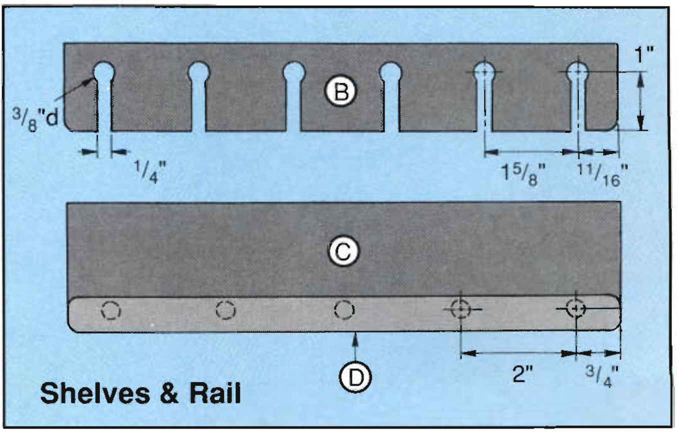
To prevent splintering while shaping the edge, tape the corners. Resaw the 3/4" stock for the shelves and plane down to about 1/4".

Whether you use a router or mount the bits in a drill press as I did, you'll need to be careful in the next step. The corners of the work piece are vulnerable to splintering by the bit, so reinforce them with duct or packaging tape; then rout the decorative edge.

From your $^{3}/_{4}$" stock cut one piece to $1^{1}/_{2}$" X $9^{1}/_{2}$" for the spoon shelves (B), and one $2^{1}/_{4}$" X $9^{1}/_{2}$" for the bottom shelf (C). Resaw these two boards, and plane the rough side until they are all about $^{1}/_{4}$" thick. If you're using pine, you can get $^{1}/_{4}$" thick battens in various widths and won't have to resaw. From one of the $2^{1}/_{4}$" wide pieces cut a $^{5}/_{8}$" wide strip for the bottom shelf (D).

On one of the spoon shelves, lay out the spoon slots and $^{3}/_{8}$" holes as shown in the Figure below. Tape the two spoon shelves together with masking tape, drill the holes, and saw out the slots. Because the endmost slots are so close to the ends of the shelves, they create a narrow finger that could easily be broken. You can strengthen it by drilling a $^{1}/_{16}$" diameter hole into this area from the back edge of the shelf to a depth of $1^{1}/_{4}$" and inserting a #17 X $1^{1}/_{4}$" brad.

To drill the bottom shelf and rail, tape the two pieces together

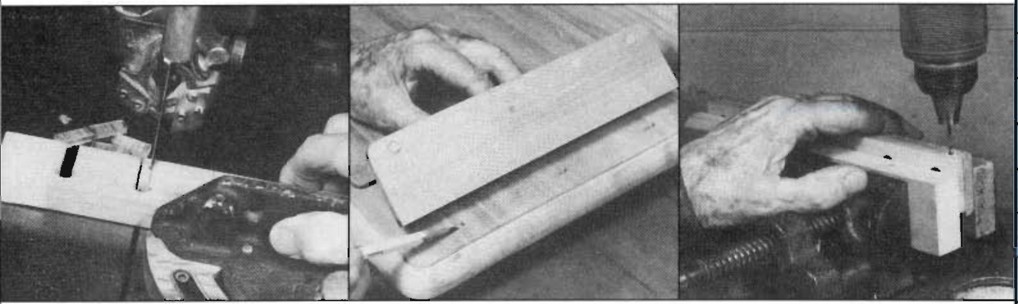


Shelves & Rail

illustrations by Bob Chapla

***Ralph Thacher** is a woodworker from Taft, California.*

Spoon Rack



After drilling 3/8" holes for the spoons, saw out the slots. Then locate screw holes for the shelves by drilling 1/16" holes, inserting brads, and impressing the points on the back edges of the shelf pieces.

Antique Spoon Rack

Cutting List

Qty	Part	Finished Size T	W	L	Piece
1	A	$^{3}/_{4}$"	11"	18"	base
2	B	$^{1}/_{4}$"	1$^{1}/_{2}$"	9$^{1}/_{2}$"	spoon shelves
1	C	$^{1}/_{4}$"	2$^{1}/_{4}$"	9$^{1}/_{2}$"	bottom shelf
1	D	$^{1}/_{4}$"	$^{5}/_{8}$"	9$^{1}/_{2}$"	shelf rail
Supplies					
1	11" X 18" scrap plywood				
9	#6 X 1$^{1}/_{2}$" flat head wood screws				
13	#17 X 1$^{1}/_{4}$" brads				
	$^{5}/_{16}$" dowel stock				

photos by the author

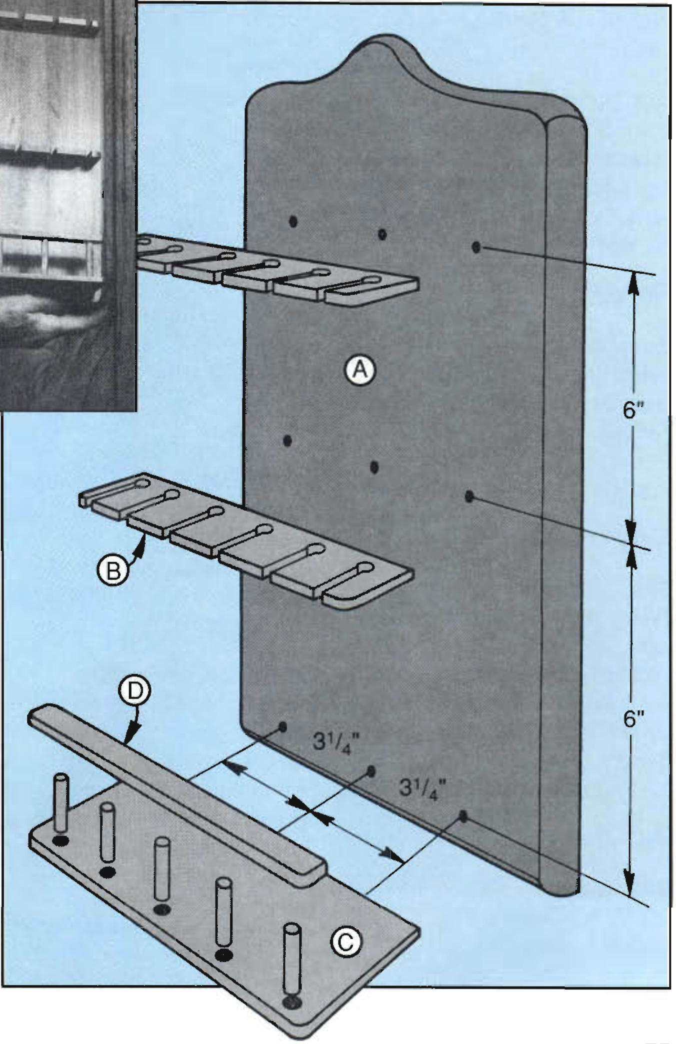
with their front edges and ends flush. With the rail down, set the depth of the drill press to drill through the shelf itself but stop halfway through the thickness of the rail. Drill these $^{5}/_{16}$" holes where shown in the Figure. On the slave board measure 3$^{1}/_{2}$" along each shelf line both ways from the center and drill $^{1}/_{16}$" holes through the boards. Drill the center points as well, and use a drill press or some means of ensuring that the holes are vertical, or the shelves won't align properly. Now install #17 X 1$^{1}/_{4}$" brads into these nine holes so their points project through the front of the board. They will serve as points for locating the screw holes for the shelves. Center each shelf carefully, with the same distance from the edge on each end, and impress the nail points into the back edge of the shelf pieces. Label each piece so you can match them up with the holes later.

Drill the holes in one operation by setting up all three shelves in a vise. Again, be sure the holes are vertical—there isn't much room for error in boards that are only $^{1}/_{4}$" thick. Start with a $^{1}/_{16}$" bit and drill to a depth of $^{3}/_{4}$"; then enlarge the holes to $^{3}/_{32}$".

Now separate the base from the slave board, remove all the brads, and enlarge the pilot screw holes to $^{9}/_{64}$" to take the shanks of the #6 X 1$^{1}/_{2}$" screws. Round off the front corners of the three shelves and the ends of the rail. At this point, you can sand everything and stain the parts, or you can finish them after assembly. Install the rail and five 2$^{1}/_{8}$" long dowels on the bottom shelf using glue, and fasten the shelves to the base.

To make the rosette, start by attaching a scrap of plywood to the lathe faceplate. Glue a small circle of $^{3}/_{4}$" stock to the plywood with a circle of heavy brown paper between the two. When dry, carefully shape the rosette using small carving chisels. Cut it off with a parting tool, sand the back, and glue it to the base.

After sanding, I stained mine with Salem Maple and added two coats of clear satin varnish. **PW**



Calendar

Events of Interest to Woodworkers

If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in *Calendar* free of charge.

California

Date: February 16
Event: Tool Clinic with Simon Watts
Location: San Francisco
For information, contact: National Maritime Museum, Bldg. 275, Crissy Field, SF, CA 94109. Tel. (415) 929-0202

Date: February 23-24, March 2-3 & 9-10
Event: Building the Chamberlin Dory Skiff with Simon Watts
Location: Hyde Street Pier, San Francisco
For information, contact: National Maritime Museum, Bldg. 275, Crissy Field, SF, CA 94109. Tel. (415) 929-0202

Date: December 7-9
Event: Spirit of Christmas Crafts Faire
Location: Santa Rosa
For information, contact: Debra Giusti, Box 484, Graton, CA 95444. Tel. (707) 823-4989

Florida

Date: February 3-8
Event: Winter Carving Workshops
Location: Orlando
For information, contact: Ward Foundation, Box 3416, Salisbury, MD 21802-3416. Tel. 1-800-742-4988

Maryland

Date: January 14 entry deadline
Event: 1991 Sugarloaf Craft Festivals
Location: Gaithersburg & Timonium
For information, contact: Deann Verdier, Sugarloaf Mt. Works, 20251 Century Blvd., Germantown, MD 20874. Tel. (301) 540-0900

Michigan

Date: December 7-9
Event: Woodworking Show
Location: Cobo Hall, Washington Blvd., Detroit, MI, 48226
For information, contact: 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. (213) 477-8521

Date: January 6
Event: Studio Furniture by Richard Kagan
Location: Detroit
For information, contact: Detroit Institute of Arts, 5200 Woodward Ave., Detroit, MI 48202. Tel.)313) 833-7963

New Jersey

Date: December 7-9
Event: NJ Holiday Crafts Festival
Location: Raritan Center Exhibition Hall, Edison
For information, contact: United Craft Enteprises, Box 326, Masonville, Ny 13804. Tel. (607) 265-3230

New York

Date: December 7-9 & 14-16
Event: WBAI Holiday Crafts Fair
Location: Columbia University
For information, contact: Matt Alperin, Box 889, Times Sq. Station, New Yor, NY 10108. Tel. (212) 695-4465

Date: January 18-20
Event: Woodworking World Show
Location: Hofstra University, Long Island
For information, contact: WANA, Box 706, Plymouth, NH 03264. Tel. (603) 536-3876

Date: through January 20
Event: Furniture by Wendell Castle
Location: University of Rochester Memorial Art Gallery
For information, contact: Detroit Institute of Arts, 5200 Woodward Ave., Detroit, MI 48202. Tel.)313) 833-7963

Date: February 14-April 30
Event: Furniture by Wendell Castle
Location: American Craft Museum, New York City
For information, contact: Detroit Institute of Arts, 5200 Woodward Ave., Detroit, MI 48202. Tel.)313) 833-7963

North Carolina

Date: January–March
Event: Ladderback Chairmaking, Windsor Chairmaking, Advanced Windsor Chairmaking
Location: Marshall
For information, contact: Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753. Tel. (704) 656-2280

Ohio

Date: January 11-13
Event: Woodworking World Show
Location: Veterans Memorial Hall, Columbus
For information, contact: WANA, Box 706, Plymouth, NH 03264. Tel. (603) 536-3876

Virginia

Date: January 4-6
Event: Woodworking World Show
Location: Norfolk Scope
For information, contact: WANA, Box 706, Plymouth, NH 03264. Tel. (603) 536-3876

Date: January 14 entry deadline
Event: Virginia Crafts Festival
Location: Prince William County Fairgrounds
For information, contact: Deann Verdier, Sugarloaf Mt. Works, 20251 Century Blvd., Germantown, MD 20874. Tel. (301) 540-0900

Washington

Date: through December 31
Event: Box Competition & Container Show; Children's Toys & Furniture Show
Location: Seattle
For information, contact: Northwest Gallery of Fine Woodworking, 202 1st Ave. S, Seattle, WA 98104. Tel. (206) 625-0542

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A Different Sort of Tool Store

by Hugh Foster

I drove out to Rick Hartom's Timeless Tools on a dreary autumn day, the first day of cold, not quite icy rain before the snow begins to fall in earnest. Glad to be out of the elements, I was warmed by the charm of the place as much as by the kerosene stove inside. Timeless Tools is the most unusual hardware store I've encountered—you can't find the usual hardware odds 'n' ends here, but you will discover a great selection of new, reconditioned, and just-plain-used woodworking tools. Hartom is a leading supplier of parts for old tools, and his store has to be as good a place to get your broken handles replaced as you are likely to find.

Timeless Tools occupies a handsome two-storey brick building. Upstairs are the family living quarters, a woodworking shop can be found in the basement, and on the first floor are six rooms full of tools—10,000 tools. Among them are a fair selection of new Record/Marples tools, a dwindling collection of clamps, an amazing selection of forestry tools, a room full of Aladdin lamps, about a hundred different how-to books (not, of course, the same how-to titles everyone else sells), and as good a selection of axes as you're likely to find in North America. I had never seen most of the axe styles on display.

Even more interesting is the collection of used tools—chisels, carving tools, axes, adzes, froes, planes, and drawknives, among many others. If there's a specific tool you want that's not listed here, query Hartom—if he doesn't have the specific tool you desire, he'll take your special order and computer bank it until one becomes available somewhere. I've examined his reconditioned

photos by the author

***Hugh Foster** is an English teaching woodworker in Manitowoc, WI.*

tools and encountered his sense of ethics, and I have no fear of ordering used tools from him. He may have the best collection of replacement parts in the country, for he doesn't believe in throwing things away. He picks up many good tools that need just a new handle or a good sharpening, and he's become expert at repairing them.

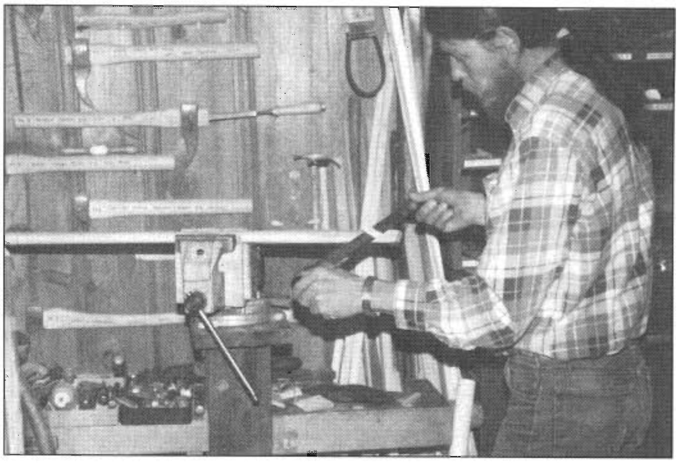
One of Timeless Tools' services is custom–fitting your broken tool with a new handle for a couple bucks plus the cost of the handle. Having suffered through the process more than once, I asked for a demonstration—after all, I had all afternoon. Surprise! It didn't take all afternoon. In fact, the procedure went so quickly that I barely managed to photograph it. Hartom could earn a very good living putting handles on axes and hammers if we could supply him with enough broken tools to keep him busy. The work can't be as easy as he makes it look!

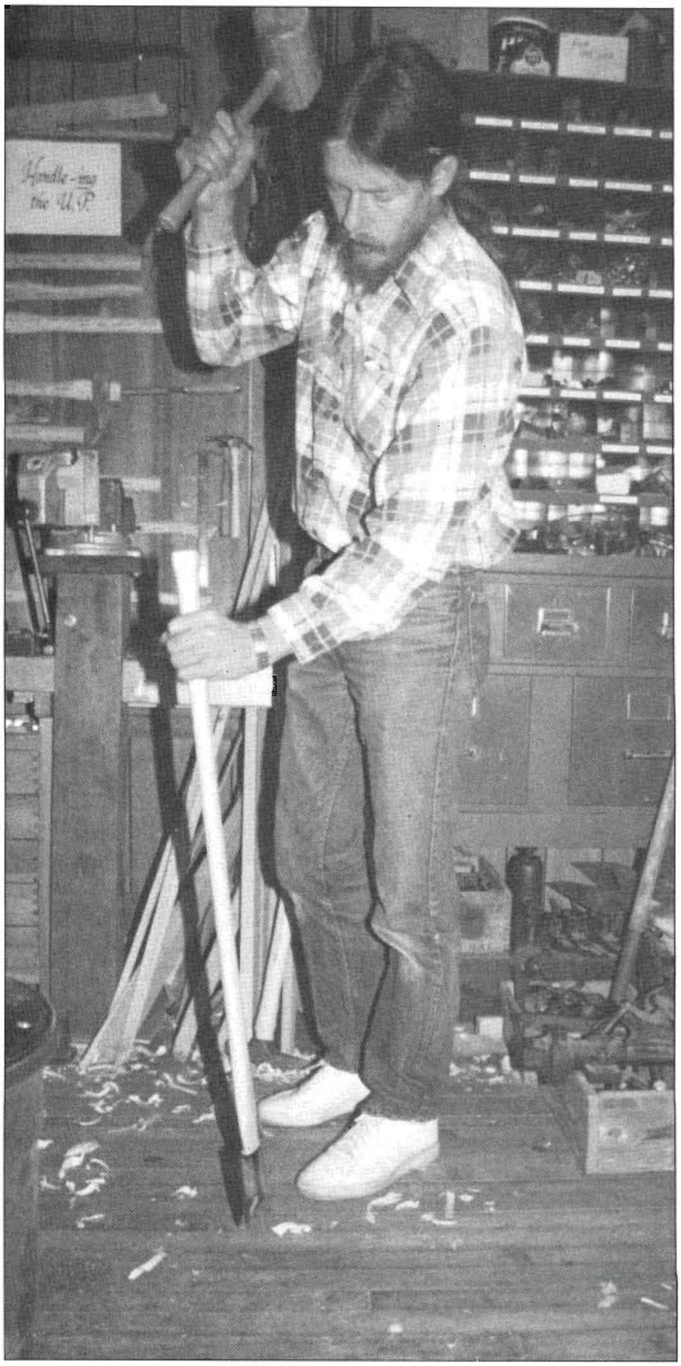
Here, briefly, is the axe-handling sequence. After eyeballing the handle and the eye of the axe, Hartom sets the handle horizontally in the vise and, with a drawknife, shaves some stock from it. He checks frequently, never removing more than a couple of shavings at a time. After a few trial fittings, he places the handle in the eye of the axe and drives it home with a wooden mallet. It's worth noting that the axe never touches the floor during the procedure—the handle's fit is such that a few blows on the butt end of the handle seat it firmly in place in the axehead. After the wedge is driven into place, the excess wood is cut away from the top with a coarse-cutting hacksaw, and a few strokes with a file make the fit look better than new. Now the axe is set in the vise vertically, handle up, so a much abused chisel (sharpened only with the file used in the last step) can clean up the messy fibers always left behind when re-handling. A step-by-step chart of the procedure, made for the Michigan State Fair a few years back, hangs over the work area to remind viewers that we're really not seeing a great secret.

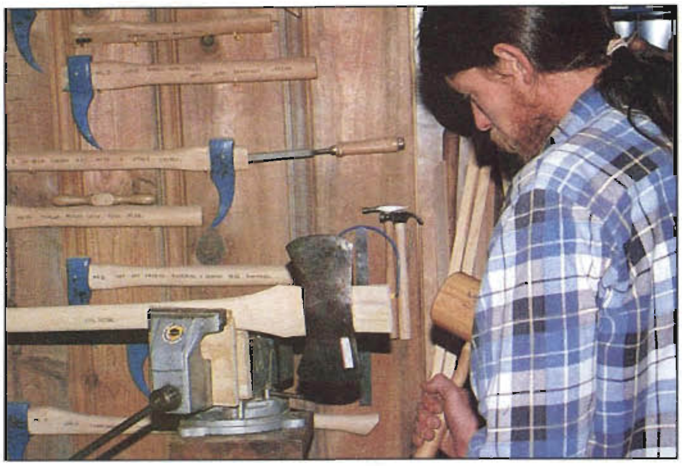
There are about fifty styles of axe still manufactured in the United States; Hartom stocks at least twenty of these, and he has a good selection of used axes as well. I was particularly interested in the Kelly broad axe, with its three kinds of handles, shown in the bottom right photo. Hartom reports that this axe is the hardest item to keep in stock. I was eyeing it as a thing of beauty; his customers use this axe for serious work, building post and beam houses.

Half of Timeless Tools' customers come from Michigan's Upper Peninsula, which is still 90% forested, and wood is common to both building and heating. Hartom believes that there is a great resurgence of craftsmanship in the building trades—"People are dissatisfied with what's available in the building market, so they're building their own homes." He's been taking classes in woodworking. "Using tools helps me explain their uses better to my customers." And he can explain the use of more or less every tool he sells. So thoroughly is Hartom captivated by his tools that he's thinking about manufacturing some—as a labor of love for good tools, not necessarily as an expression of entrepreneurial ambition.

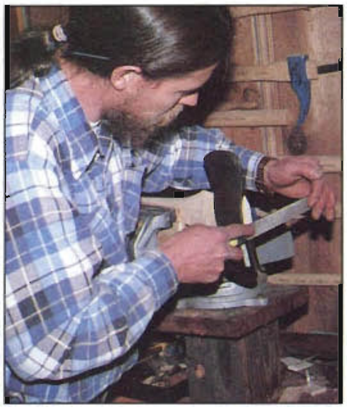
He's learned a great deal about turning, and has turned a lot of bowls much in the style of Richard Raffan. Lately the price of Raffan's work has risen so drastically that the prices on the lovely bowls in Hartom's shop seem by comparison very afordable, even by the likes of you and me. As his turning technique becomes ever more refined, and as our present master turners work less and







photos by the author

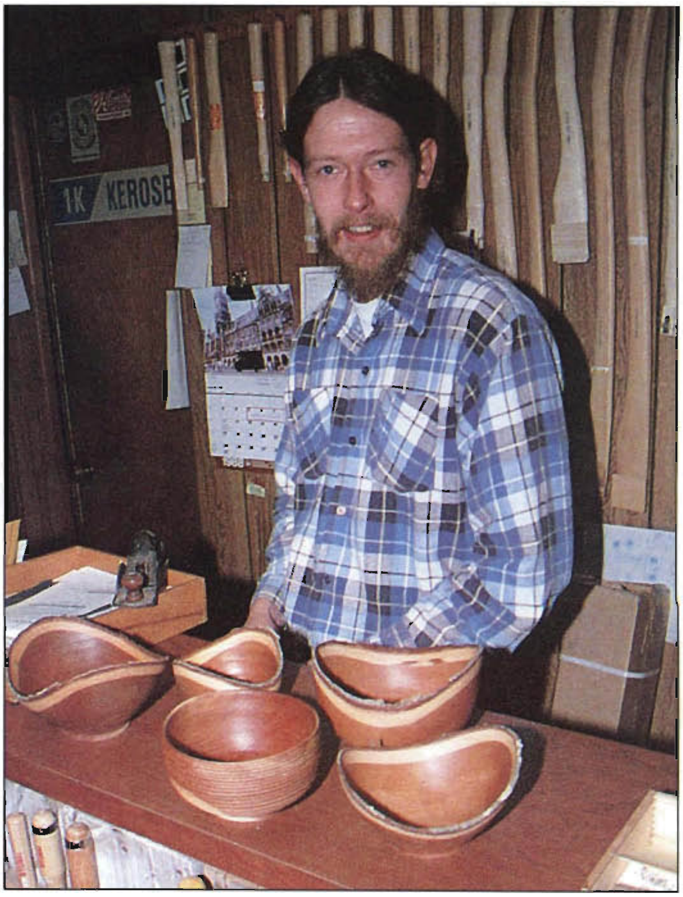


To handle an axe, fit the handle to the eye taking as few shavings as you can (top left).

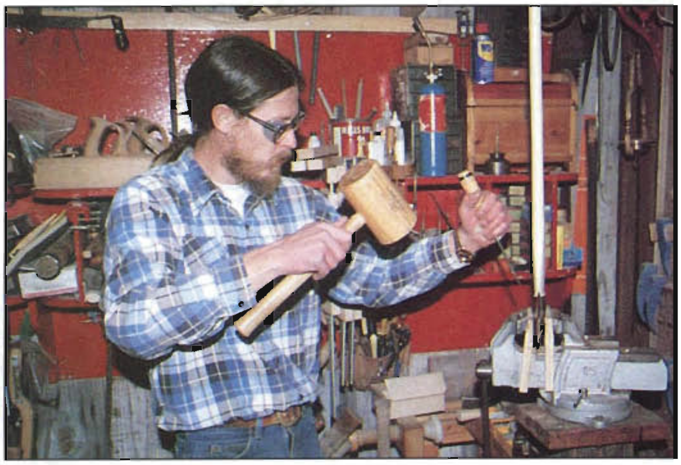
Start the head onto the handle; then strike the butt of the handle (left). Inertia from the blow will force the head on, so there's no need to brace it against the floor.

Drive in the wedge (above) and saw it flush (right).

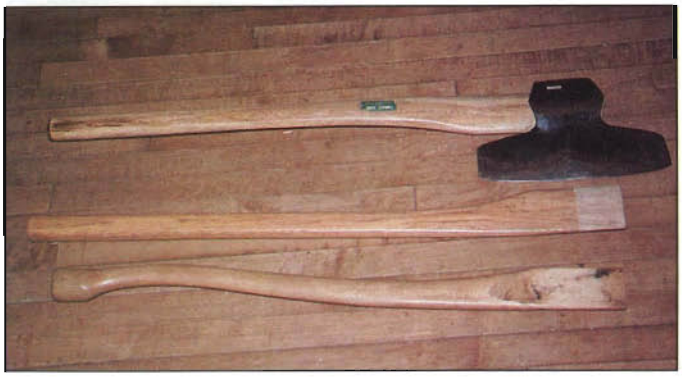
Then trim off the excess fibers (below). Rick uses an old spare chisel that he's devoted to this purpose.



In addition to selling tools, Rick likes turning natural–edge bowls.



The Kelly broad axe shown below with its different handle designs, is the kind of hard–to–find item Rick specializes in; it's in big demand by customers who build post–and–beam houses.



less, Hartom's bowls are sure to become collector's items. After spending the summer turning bowls on the county fair circuit, his art has progressed so far that some of his bowls are on display at the Neville Museum in Green Bay.

As we talked about the tool business, I learned that many of the big manufacturers don't want to supply tools to little companies like Timeless Tools. One prominent clamp manufacturer demands a minimum of $6,000 in orders per annum. This is bad for us tool buyers, for only this kind of knowledgeable dealer can help us find the tool we need for a certain job, or tell us how to do certain jobs with certain tools. Of course, some other companies, notably Inca, have all but abandoned their dealer networks, claiming as the reason not greed, but an attempt to continue bringing affordable tools to American woodworkers despite the problems facing American currency worldwide. PW

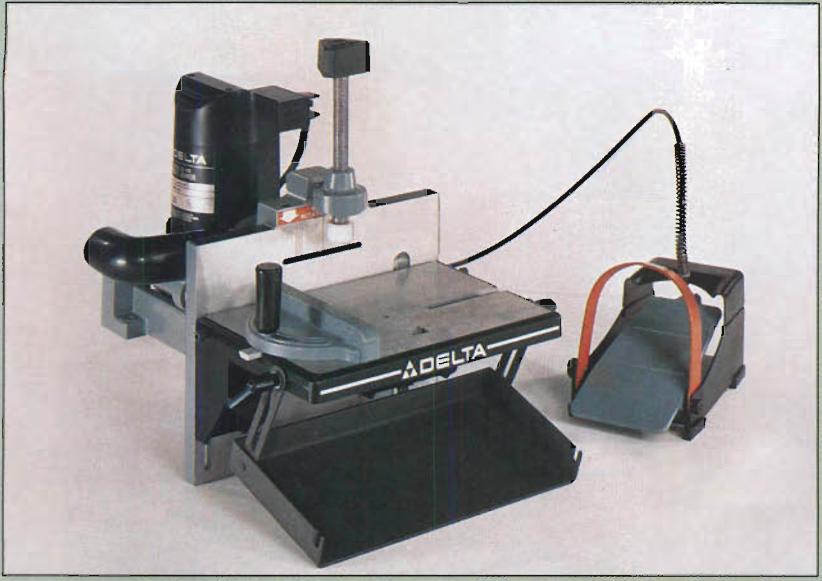
For More Information

You can have a copy of Timeless Tools' interesting catalog for two dollars, You'll get a couple of hours' good entertainment, and you're likely to find a timely bargain.

Timeless Tools
122 W. Spring St.
Marquette, Michigan 49855

TOOL TALK

by Sanford Wilk



The Delta Table–Mounted Plate Joiner

By now, you probably know what a plate or biscuit joiner is. Lamello, Freud, Porter–Cable, and other manufacturers have been offering hand held, portable plate joiners for a few years now. (See "Is There a Plate Joiner in Your Future?" *PW* #37, June/July 1987.)

The typical plate joiner makes use of a small circular saw blade to cut a pocket into two pieces of stock. When a biscuit (a compressed spline) is glued into the pocket, the glue swells it, and the result is a bridge between the two pieces of stock that's strong and tight. The biscuits are an excellent alternative to dowels in most applications, and because they're actually little pieces of plywood, they offer superior strength.

All the other plate joiners require that the stock be clamped or otherwise secured while cutting the pocket; this slows down the whole process. Delta, however, had the foresight to realize that bracing the wood during the cut is an inconvenience. They responded by designing a bench–top tool that offers a work surface to support the stock and a clamping system that embraces it during the cut. Instead of pushing the unit into the wood, you simply push down on a foot pedal. The blade then comes out of its "shell," and heads into the stock which is resting firmly and securely on the tool's table.

The table operates on two rails that let it slide up and down, and an adjustable pointer allows you to set the depth without using a piece of scrap. (I still advise double–checking alignment with a test piece before actually making the cut.) If you need to make a thickness adjustment, it only takes a quick turn of two knobs.

This idea of having the machine stationary imposes a limitation that portable biscuit joiners don't have: you can't use the Delta unit to cut biscuit slots on the face of a board in from the ends. In other words, you can't use it to join partitions on the inside of a carcase, but you're probably better off just using a good old–fashioned dado for that anyway.

The only real objection about the machine that I heard from any of the testers concerned the size of the table. It is on the small side when you try machining stock that's over 24" in width, but then again, you don't often come across such applications.

I would recommend this tool for anyone that seems to be spending a lot of

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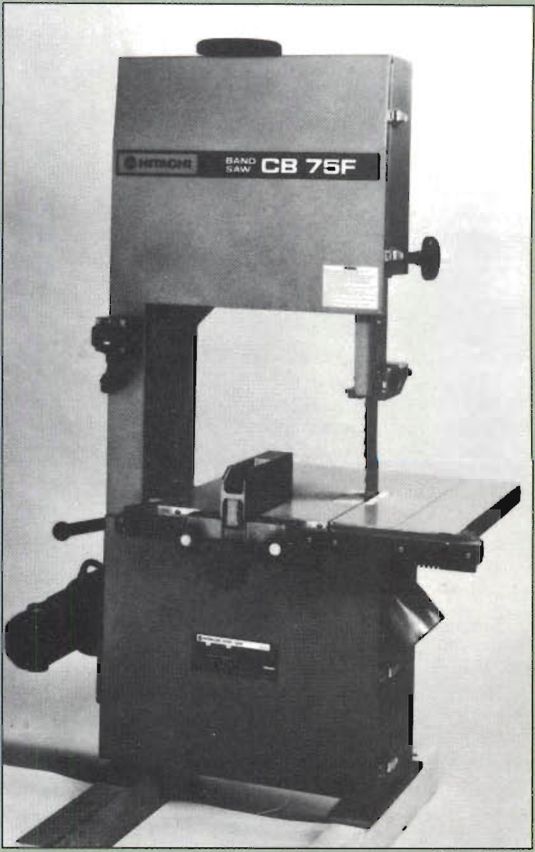
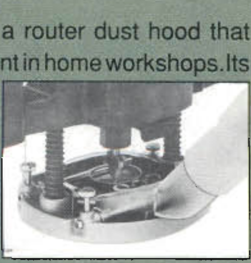
***Sanford Wilk** is a builder and an organic architect in San Francisco, CA. His team of technicians—in fields ranging from finished carpentry to cabinetry and furnituremaking—evaluate tools under actual working conditions.*



Getting Hooked

The new Hook Mate™ keeps peg-board hooks from falling out. This nifty gadget comes in $^1/_8$" and $^1/_4$" sizes, and is made of zinc plated spring steel. (P.X. Industries, Inc., 199 Winter Street, W. Hanover, Massachusetts 02339, phone 800-225-0396)

Router Dust Control



Skil has introduced a router dust hood that improves the environment in home workshops. Its adaptor nozzle fits all popular vacuum hose, and the device is said to be 95% efficient in picking up surface cutting dust and up to 75% efficient on edge routing applications. (Skil Corp., 4300 W. Peterson Ave., Chicago, IL 60646, phone 312-286-7330) shop time and resources on doweling procedures. It also makes bevel edge joining into a simple process that takes about a third of the time to perform over the standard drilling methods typically used for such types of joinery. The Delta model 32-100 plate joiner lists for $665.00, but you can save some serious money if you shop around; I was able to find it for just under $470.00, including freight. (Delta International Machinery Corp., 246 Alpha Drive, Pittsburgh, PA 15238 412-963-2400)

Hitachi's Model CB75F Band Saw

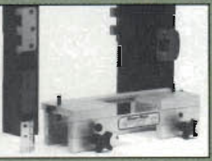
The Hitachi CB75F comes set up for resawing—one of its best applications, but it's also a good heavy–duty band saw. It has a maximum cutting height of $11^{13}/_{16}$", and comes equipped with a 3" Stellite blade, but it has the ability to reduce down to a blade as small as $^{1}/_{4}$". The manufacturer calls this a full–range, from 3" to $^{1}/_{4}$", but Hitachi only sells $^{1}/_{4}$", $^{3}/_{8}$", $^{1}/_{2}$", 1", and 3" blades. You can purchase other widths from custom blade suppliers, but don't expect to find this $111^{3}/_{16}$" long blade at the local hardware store. I should also mention that the unit's blade guide needs to be swapped if you plan to use a blade that's smaller than the 3" one. If you want to use a 1" blade, then be prepared to install a new guide, and you'll need a third guide to use $^{1}/_{2}$", $^{3}/_{8}$", or $^{1}/_{4}$" blades. Changing the guide just requires the loosening of a few screws, and the changeover time is small on both the guide and the blade itself. You will, however, have to spend the extra dough on the guides, which sell for about $90.00 each.

NEWS AND NOTES

Keeping It Clean

The Dustblocker™ apron helps to keep your underwear free of chips and debris. It's made of coated nylon, and it has a high neckline to keep particles out. (National Decks, Inc., P.O. Box 1125, Alfred, New York 14802, phone 607-587-9558)

Hanging It Up



The Hinge–Mate mortising tool helps you to rout the hinge mortises in interior and exterior entry doors, as well as cabinet doors, boxes, etc. The Hinge–Mate works with any router, and the tool comes with guide, case, and bit. (D.C. Precision Tools, Inc., 11 Mathews Avenue, Riverdale, New Jersey 07457, phone 800-462-2481)

As far as power goes, the Hitachi CB75F has a sufficient amount of gumption to handle resawing full width hardwood stock with no problem. The manufacturer lists the horsepower at 2.8, but I'm not sure that's 100% accurate. The saw outpowers most other small shop band saws in its class, and it can certainly handle scroll work like a hot knife cutting through butter.

The saw comes with a nice fence (for resawing, mostly) and a smooth–operating guard; both move on a rack and pinion system. By turning an oversized knob, you turn a gear which follows the teeth of either the table or the guard.

One of the few things our technicians didn't entirely like about the saw was its dust collection chute. The chute forces you to connect a dust collection system, or it will empty right out onto your feet. Now don't misunderstand me, I think that every shop, no matter how small, should have a dust collection system, but I don't like having something dump dust on my feet if it isn't hooked up to a collector. Fortunately, the dust chute works well once it's hooked up to the collector, but depending on how close you normally get to the machine (I like to sit on a stool in front of machinery from time to time), the hose or ductwork might get in the way of your knees.

Other features include a hand brake for blade stoppage, the usual tilting table (0°-45°), and a blade–tension adjustment control that offers extreme accuracy and sensitivity. This tension control is really worth bragging about. It offers the sensitivity for very fine adjustment that matches the sensitivity found in a woodworker's hands.

The saw has a throat depth (cutting width) of about 14", runs on 120 volt current, and it weighs about 300 pounds. You won't need to purchase an "optional" stand with this baby, since it makes use of all the space available by efficiently putting the lower blade wheel and other workings into the built–in base. The Hitachi machine sells for about $1,800.00, but when you consider the quality of the equipment that you're purchasing, the high cost doesn't seem so bad. (Hitachi Power Tools USA Ltd., 4487-E Park Drive, Norcross, Georgia 30093 404-925-1774)

Nu–Mark's 1/2" Shaper

I don't often test or write about copycat machinery. It has nothing to do with any bias against companies that copy other manufacturer's equipment. If they made the same piece, with the same quality, and at a lower price—then believe me—I would recommend it. The problem comes in the area of quality.

As is often found in all types of replication (not just machinery), something is lost from the original. The experiences of all of the technicians that work with me is that copycat machinery always lacks something; the question is: where is the line between an acceptable replication and garbage. Close tooling tolerances, well–detailed castings, good quality motors & switches, and the manufacturer's reputation is where I draw the line. It also helps if the machine isn't missing half of the nuts and bolts needed for assembly.

The Nu–Mark machine is basically a take–off of the Delta #43-120, $^{1}/_{2}$" light duty wood shaper (it's interesting to note that most copycat machines base their designs on Delta products). Delta, however, uses a 1 hp motor while the Nu–Mark machine uses a $^{3}/_{4}$ hp unit. The drop in power really isn't that drastic, but the Nu–Mark shaper can be felt wanting for juice when it's running some of the larger panel knives. That's the first difference between original and copy; the second variation comes when you assemble the machine. It takes almost

1-$^{1}/_{2}$ hours longer to assemble and fine tune the Nu–Mark unit over the Delta. Part of this is due to the lack of small hardware, and part is due to the fact that Delta sends most small shop machinery already tuned for use. When I say "tuned," I mean that holes line up, tables are leveled, switches are wired, etc. I don't have a problem with the extra assembly and tuning involved with copycat machinery. It can save the average woodworker hundreds of dollars on each machine, and thousands over the course of putting together a shop.

The Nu–Mark machine ranked very well as far as completeness of parts and need for additional assembly goes. It had almost every nut, bolt, and washer required in the box, and we didn't have to drill out a bunch of holes because they were misaligned. We expected to spend a lot longer putting the unit together than we actually did.

When it came to doing its job, the Nu–Mark unit did well in most areas. Its motor had good power, its base was stable, the fence adjusted easily (like the Delta unit, it has a single knob for the positioning of the fence), the locking height was easy to change, and the table was extremely well finished so that stock remained flat. The only thing that we questioned was the chatter coming from the motor. Every now and then it seemed to talk to us, and that made us worry about its longevity. The spindle travel, and speed were exactly the same as Delta's, coming in at $^{7}/_{8}$" and 9,000 r.p.m., respectively.

If you want a shaper, but can't afford the Delta, then the Nu–Mark #40-120 is probably your best choice in the $^{1}/_{2}$" class. The suggested retail price is $459.95 with stand and motor. I was able to find it selling for $375.00, and that makes the extra assembly time palatable. (Nu–Mark Incorporated, 13306 W. 99th St., Lenexa, Kansas 66215, phone 800-248-4799)

Freud's EB100 Edge Bander

Due to the high cost and the need to conserve space, most woodworkers have shied away from tools like mortising machines and edge banders. Leaving the first machine aside for now, Freud has done for the edge bander what Apple has done for computers: they've made an ultra–expensive, room–sized machine into an affordable, portable, efficient, and user–friendly tool.

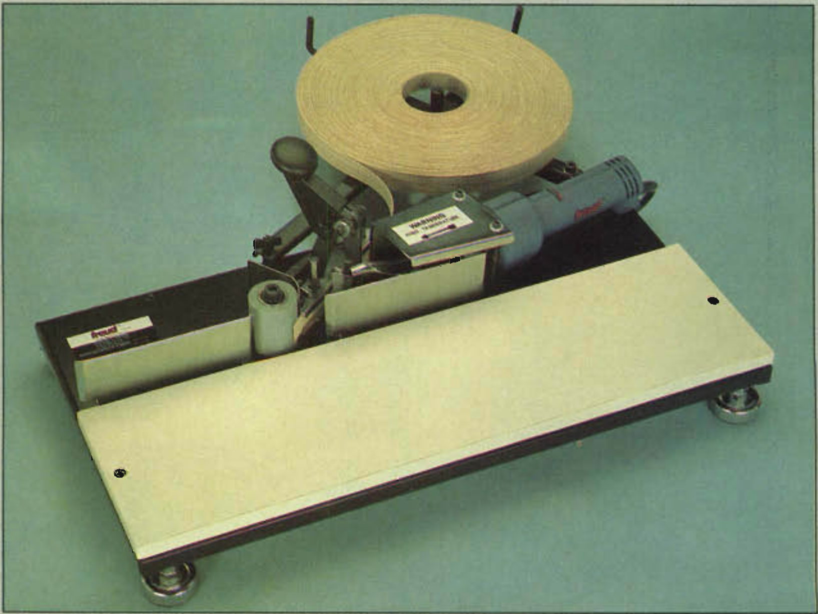
Edge banding is the process that applies a wood or polyester veneer to the visible edge of plywood. In the past, edge banding in the small shop was routinely performed with a hand–held iron and edge banding material that was backed with hot melt glue. The Freud EB-100 still makes use of the same banding material, but eliminates the iron that caused a lot of hand burns.

Freud offers 10 varieties of banding that are $^{13}/_{16}$" wide, but the EB-100 will take banding as wide as 2$^{1}/_{4}$". A 250 foot roll is placed in the support, and is routed past an adjustable heat source (200° to 1,100° Fahrenheit) over a pressure roller that applies the band to the plywood. The plywood is fed by hand over the pinch roller with the help of two adjustable fences.

The heat source adjustment decides how quickly the adhesive melts, but don't assume that faster is better. Adjusting the heat is as easy as rotating a very accessible dial, but set it to a rate that you can handle. If it's set too high, you'll have to feed at a sloppy speed, and your edge will look rough and bumpy.

The Freud unit has a generous 8" wide by 27" long table that is covered with plastic laminate to allow for easy glue removal. It also has four oversized feet that keep it from moving while you feed it. Once an edge is banded, you cut the material by pressing down on a good–sized knob which removes the risk of burning yourself from contact with the hot adhesive. Since the Freud unit does not come with a stand, it must be placed on a tabletop near a 110–volt plug.

The best part about the Freud EB-100 is its price. A machine that used to only be affordable to large, high–volume shops, and that cost thousands of dollars, has been down–sized and made available for a more than reasonable $350.00. Freud also offers 250 foot rolls of $^{13}/_{16}$" banding priced from $33.00 (for the polyesters) to $58.00 (for walnut) per roll. The Freud unit may not be useful for a multi–million dollar shop, but it can more than adequately meet the demands of a small shop that only does one project at a time. (Freud, 218 Feld Avenue, High Point, North Carolina 27264 800-334-4107) PW



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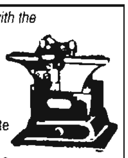

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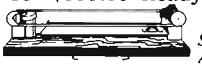

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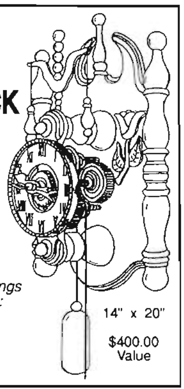

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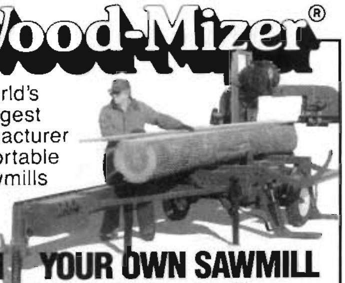

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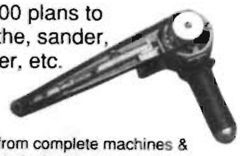

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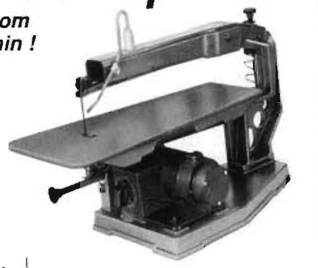

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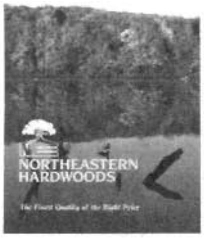

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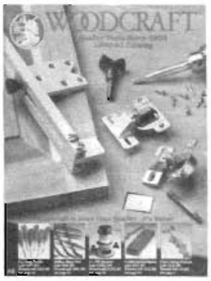

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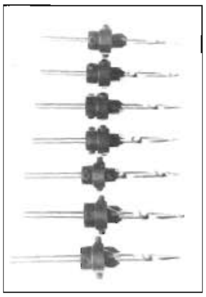

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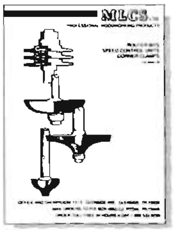

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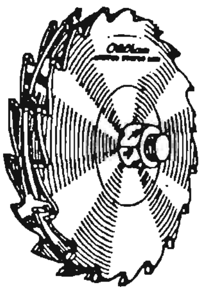

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Red Oak

by Ken Textor

Since Old Testament times, oak has been the great–granddad of all woodworking lumbers. Its strength, versatility and abundance have earned it a reputation that has endured through the millenia right down to today. The huge family of oaks includes two distinctive branches—the red and the white oaks—and the differences are important.

Red oaks, sometimes called black oaks, are a bit more plentiful than the white. We'll look at them closely in this article, make some comparisons, but save an in–depth examination of white oak for the next issue of *Popular Woodworking*.

General Description

Red oaks harbor at least a dozen distinct species, plus a myriad of colorful local names for each. The common names of the principal species include northern and southern red, scarlet, black, bear, yellow, pin, water, cherrybark, laurel, willow, shumard and nuttal. All fall under the botanically correct latin names *quercus rubra*, *quercus falcata*, *quercus coccinea*, and so on. The sapwood is almost pure white while the heartwood is usually a red–tinged brown. Once the tree has been sawn into lumber, it's virtually impossible to tell exactly which species of red oak you're getting. But it's not difficult to distinguish red from white oak, the latter having no reddish cast. Red oak's grain also differs from that of white oak; it's very open and porous, which has several advantages when finishing the wood. Both oaks show a unique and attractive grain pattern known as "broad rays"—small lines that radiate outward from the heart of the wood. These rays are particularly prominent and appealing when the lumber is quartersawn.

wood photos by the author

The weight and strength of the two oaks are comparable, and generally rated high, just shy of the much less abundant shagbark hickory and black locust. Red oaks are found in just about all deciduous forests in the United States, and it's widely distributed throughout the world. Thus, its strength, weight and abundance explain why it's always been favored for flooring, furniture, woodenware, caskets, pallets, barrels, dowels, bridge timbers, boats, and even railroad cars.

You do have to be careful not to use red oak where conditions are conducive to rot. Unlike the white oaks, the reds are not very resistant and should not be used for outdoor furniture, posts and the like. Red oak also tends to shrink quite a bit as it dries. Unless your project calls for bending it, try to buy red oak kiln–dried—with a moisture content of 10% or less.

Working Properties

Red oak is extremely versatile and a pleasure to work. It's usually fairly straight–grained, making it easy to plane. Sanding is relatively easy because of oak's toughness, which makes sanding "dips" that can easily occur in softer woods less likely. When sanding or planing, you may notice a distinctive sweet vinegary smell, which has prompted many amusing nicknames for oak. It's caused by an acid in the wood that was once used in tanning leather.

Elasticity is another important property of red oak—but you have to be careful here. I've found that the common steam–bending process used in making bow–back chairs, curved

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Ken Textor is a woodworker and writer in Arrowsic, Maine.

A wide range of finish effects is possible with red oak. In the background shines the warm richness of oak stained and oiled to bring out its red tones. The inset displays the opposite—an armoire whose "white-wash" mutes the strong grain and color, resulting in a cool look. This form of finish is very popular with furniture buyers today.

furniture photos by Greg Scharver

edgings, small boat ribs and so on, is not always successful when the wood is kiln–dried. Slightly green (about 40% moisture content), air–dried red oak results in fewer splits during bending, and the steaming time is shorter. Some lumber specialists insist that kiln–dried and air–dried red oak have the same bending qualities, but in my experience there's a difference.

Red oak's ability to powerfully retain screws, nails and dowels is not in dispute, but you'll have to drill pilot holes for all of them. Once the wood dries, it becomes extremely resistant to any sort of crushing, even if it's just a nail trying to shoulder its way in between the cells. Furthermore, if you're using iron fastenings, be certain that you won't have to remove them. Over time, certain compounds in the wood react with iron to create a bond between wood and metal that is impossible to break without destroying the surrounding fibers, the fasteners or both.

Most glues work well with red oak, but not always with white oak. It doesn't have the open pores that red oak has and which epoxies often need for a good bond.

Finishing

Red oak is great fun if you like to experiment with stains and coloring pastes. That open grain permits you to make interesting patterns and varying color intensities not possible with other woods. I've found that the wood's natural reddish tinge can be heightened or toned down, but never really completely eliminated. Thinned paint or "solid stain" has an effect that some of my customers like. The prominent open grain can still be seen, making the texture of the wood a secondary feature that attracts the eye almost as much as the paint's color. This can be a strong selling point in cabinets when a customer is trying to decide between synthetic facings and real wood.

Clear finishes work just fine with red oak, too. Polyurethanes, varnishes and shellacs may require some extra work, though, particularly if you want a perfectly smooth finish. The open grain usually needs to be filled with an extra coat or two of clear finish. And you may need to sand between coats with a slightly rougher than normal sandpaper, say 150 or 180–grit.

Availability

Red oak can be had in plywood, veneers and whole lumber—but don't get talked into "pallet stock." This is usually knotty, unstable oak commonly saved for making rough warehouse pallets and packing crates, and can be very cheap, as little as seventy–five cents a board foot. It can serve in large dimensions (6" X 6") for heavy construction, but it's not suitable for furniture and other woodworking projects. Clear red oak is best.

If you want to do a lot of bending, obtain quartersawn red oak. And if you're going to lay a floor in red oak, use narrow boards—3" or less. They're more work to install, but any further shrinkage in the drying process will be much less noticeable.

Red oak is available in virtually all thicknesses, widths and lengths. Depending on your location, the price for roughsawn lumber can be as little as $1.50 per board foot to more than $3. Oak plywoods and veneers are generally in this same hardwood pricing midrange. Red oak is slightly more plentiful in northern states and should be cheaper. You can lower costs by saving your scraps and selling them for cooking firewood. I've found campers and even backyard barbeque gourmets who'll pay up to $5 for a grocery bag full of red oak scraps—but make sure they have no glue or finishes on them! I must admit that oak charcoals make a grilled steak taste great, particularly when served on a red oak table you built yourself. PW

Woodworking Bricolage

by Hugh Foster

There are two kinds of workers: one kind makes a detailed plan for each creation, then follows it, step-by-step, while the other kind just starts puttering around with ideas or materials until some kind of order begins to emerge. If you are the latter kind of worker, you've probably suffered more than your share of foolishness at the hands of your allegedly more analytically-minded colleagues. But if you are any good at "thinking by the seat of your pants," you also know that you are capable of putting together concoctions on the fly that the careful pre-planners will probably never achieve in years of deliberate effort.

As I was reading Howard Rheingold's "They Have a Word for It," I found a term that fits most of the woodworkers I know better than any other. Rheingold would have us adopt the French word "bricoleur" this way: "A person who constructs things by random messing around without following an explicit plan."

In woodworking, we are all still learning. When I build a project for an article, I often have to go back after completing it to measure all the dimensions so I can make a cutting list. And the method by which I describe the construction is surely not the exact procedure I followed when building it; it's more like the process I would hope to follow if I had to build it again.

When I build a project from someone else's plans, I build more slowly than do most of my more analytic counterparts. These know-it-alls just cut out all the pieces, slap the project together rather soullessly, and that's that. I have to go more slowly. I cut each piece more or less as I use it. The pieces have to match not only the cutting list, but they also have to "fit." Sometimes those pieces that fit "by the numbers" don't fit "in fact." My pieces have to be right "in fact." Building this way takes a bit longer but that's not a problem for me; I never bill by the hour. That the completed project may not wind up being exactly what I started to build isn't a problem either. Bricolage gives me a label to use as I explain possible variations from the original concept.

My bricolage has seldom presented a problem and, when it does, I am content to remind myself that I am a woodworker, not an engineer. That doesn't mean that my projects are less than workmanlike or inferior in any way. It means simply that I approach each aspect of the task as a serious part of the whole, and that there are stages of the task that may not have gotten enough consideration before I got to them with boards in hand. Only a bricoleur works on problem-solving all the way to the end of the project. Considered thus, bricolage has become a badge of honor rather than an object of scorn. And, clients who won't engage in some bricolage with me probably don't really want a piece of my work in their homes or offices, anyway, and that's fine with me. Life in this random universe is much too short to spend it on the unappreciative. PW

Hugh Foster is a part-time furniture designer/builder in Manitowoc, Wisconsin and the author of The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*

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Recently I hired a cabinetmaker to make a set of drawers for the old desk in my study. "Nothing fancy," I instructed him. "If they fit and don't fall apart, that's good enough."

A few days later I stopped at his workshop to see how he was progressing. He had finished two of the drawers, both precise and beautiful specimens of skilled workmanship, and was working on the back panel of the third. Watching him, one would have thought that his life depended on the perfection of that part alone. "Why take so much trouble with something that won't be seen?" I asked. "Who'll ever know the difference?"

He straightened in surprise. "Why, I will."

❧

Visiting Oregon, my wife and I followed a well–worn path through pines and birches until we came upon a rustic home. We began talking with the man who lived there about the beauty of the rivers and woods, and I remarked, "You certainly must ship a lot of pulpwood from this part of the state."

"Oh, yes," replied our new acquaintance. "But the tourists bring most of it back."

"How's that?" I asked.

The man waved his hand toward the littered path. "Candy wrappers, paper plates, tissues, even disposable diapers..." PW

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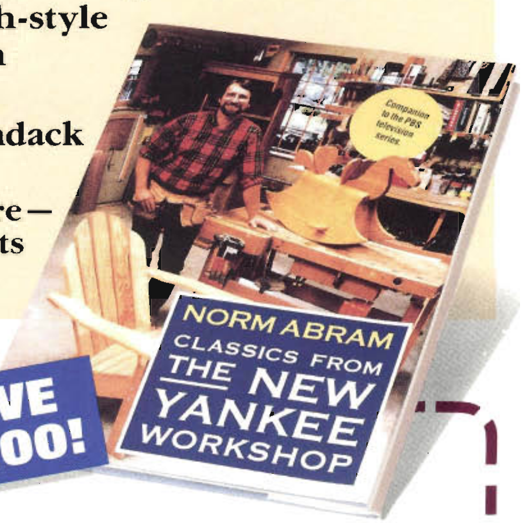

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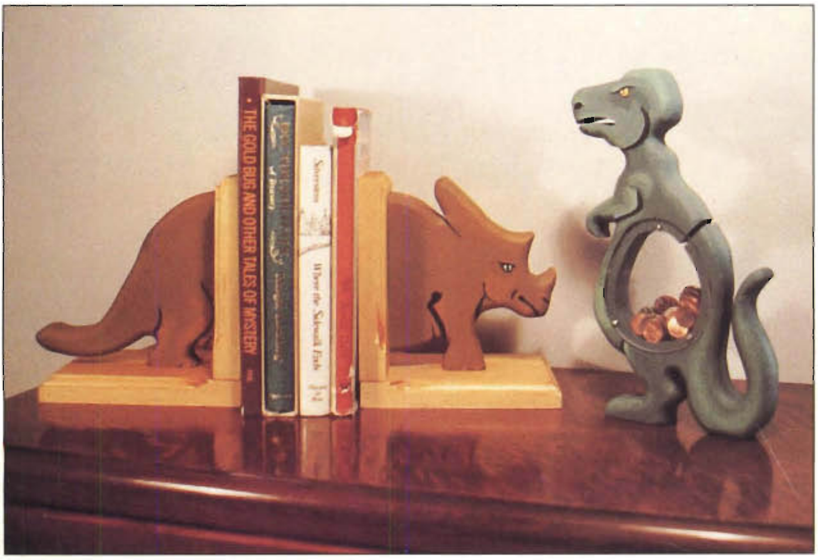

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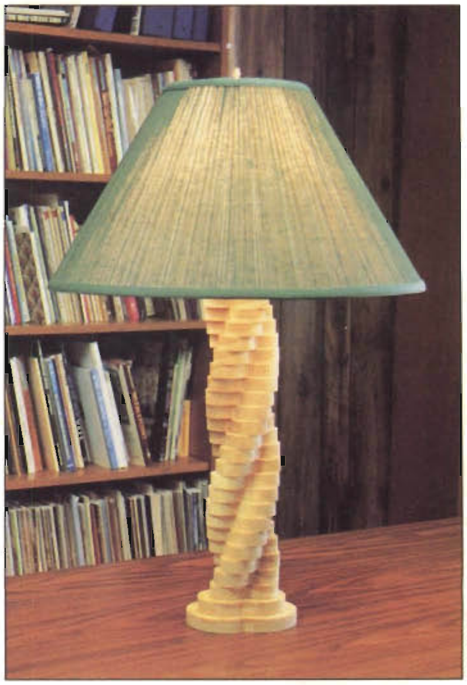

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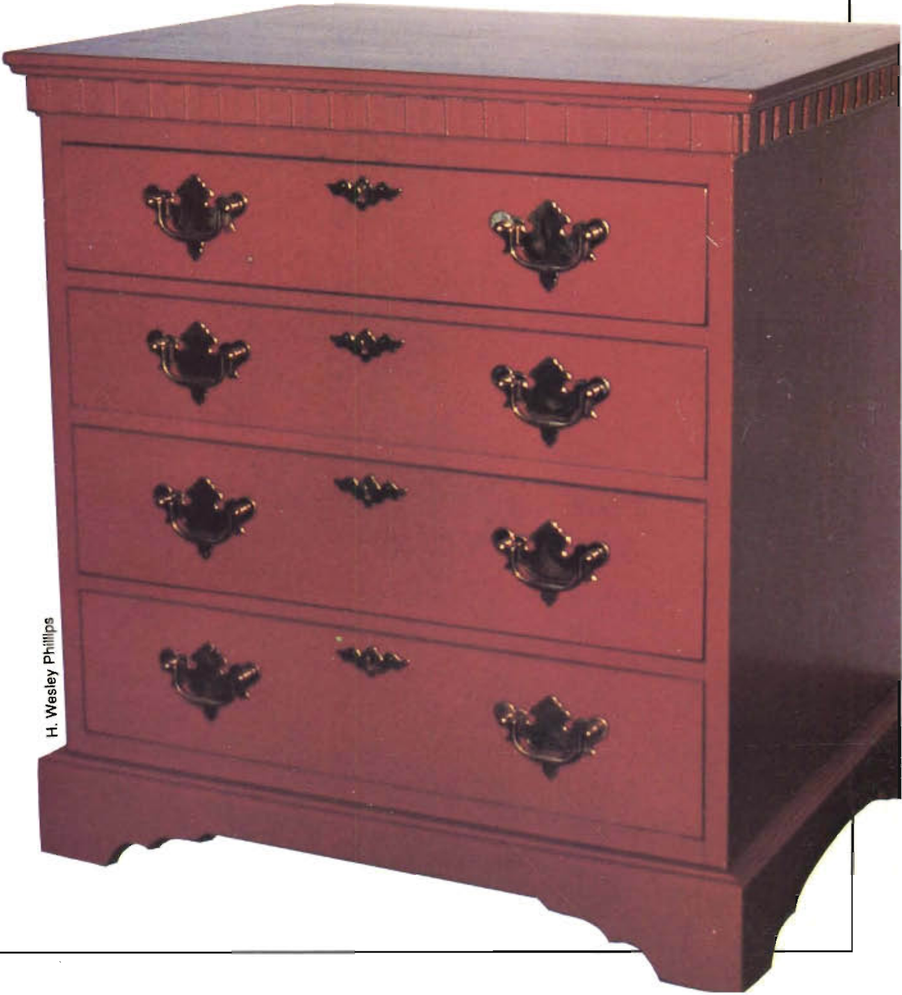

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